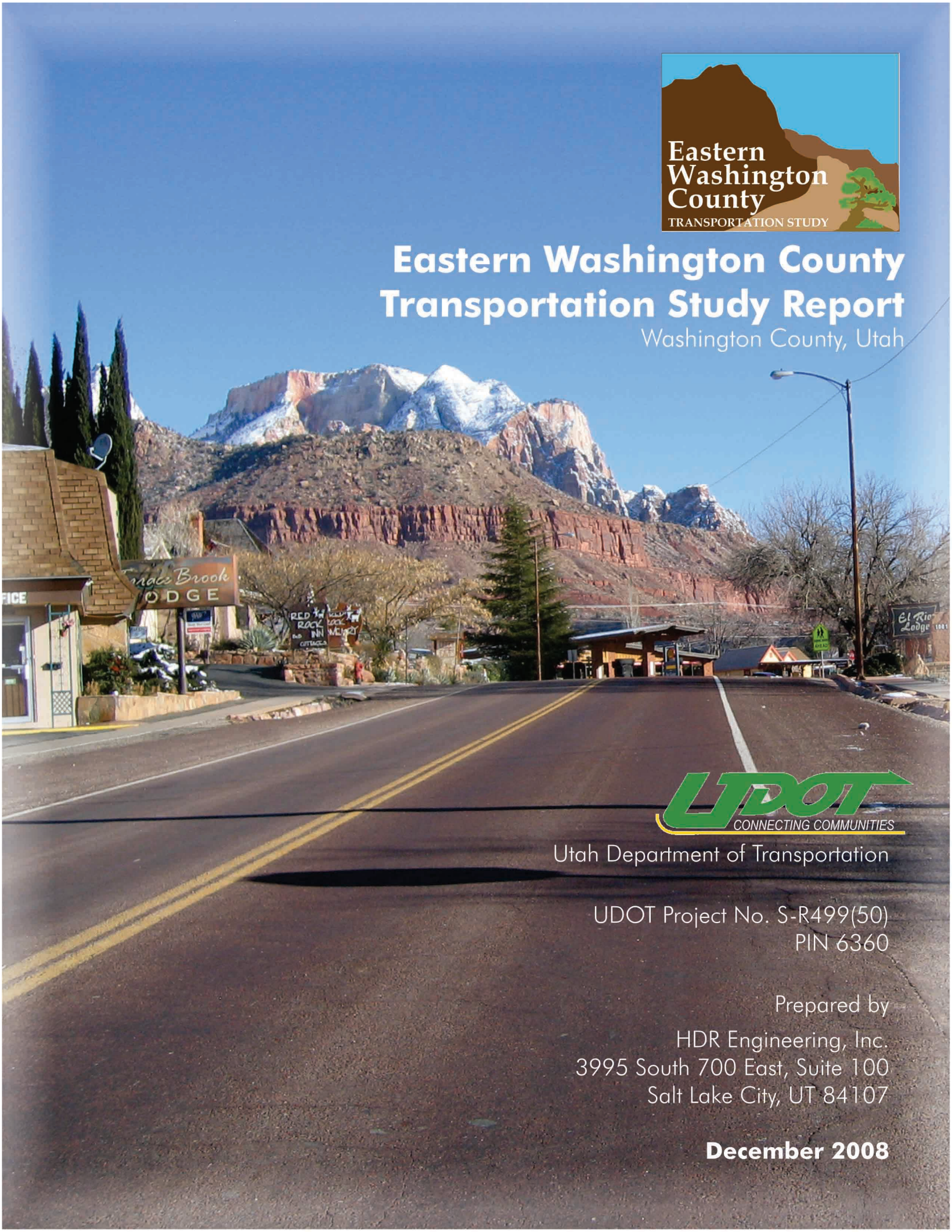

Eastern Washington County Transportation Study Report

Washington County, Utah

Utah Department of Transportation

UDOT Project No. S-R499(50)
PIN 6360

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1.0 Introduction

The Utah Department of Transportation (UDOT) recognizes the importance of the transportation system in eastern Washington County, Utah, and commissioned a study (the Eastern Washington County Transportation Study, or EWCTS) to formulate strategies for meeting the long-term needs of the public and for developing efficient transportation facilities in the area. This report, which summarizes the results of the study, provides recommendations for improvements to three transportation corridors: State Route (SR) 9, SR-17, and SR-59. This report also summarizes the existing conditions of the highways, describes the environmental setting where the highways are located, provides recommendations for implementing improvement projects, and provides cost estimates for some of the recommended projects.

UDOT used a collaborative process to complete the transportation study that involved seeking input from affected local governments, state and federal agencies, user groups, property owners, and business operators. The intent of the study was to develop a plan that identifies transportation needs and prioritizes potential solutions (project recommendations) for the three corridors. The study addressed needs through about 2035.

1.1 Overview of the Study Area

This study report focuses on the condition of and needs along SR-9 from Hurricane to the Zion National Park boundary in Springdale, all of SR-17, and all of SR-59. The segment of SR-9 in the study area runs generally east-west for about 22 miles (see Figure 1 below). SR-17, which is about 6 miles long, runs north-south between Interstate 15 (I-15) and SR-9. SR-59 runs generally northwest-southeast for about 22 miles, from Hildale at the Utah-Arizona border to Hurricane. In total, the study area includes about 50 miles of state highway.

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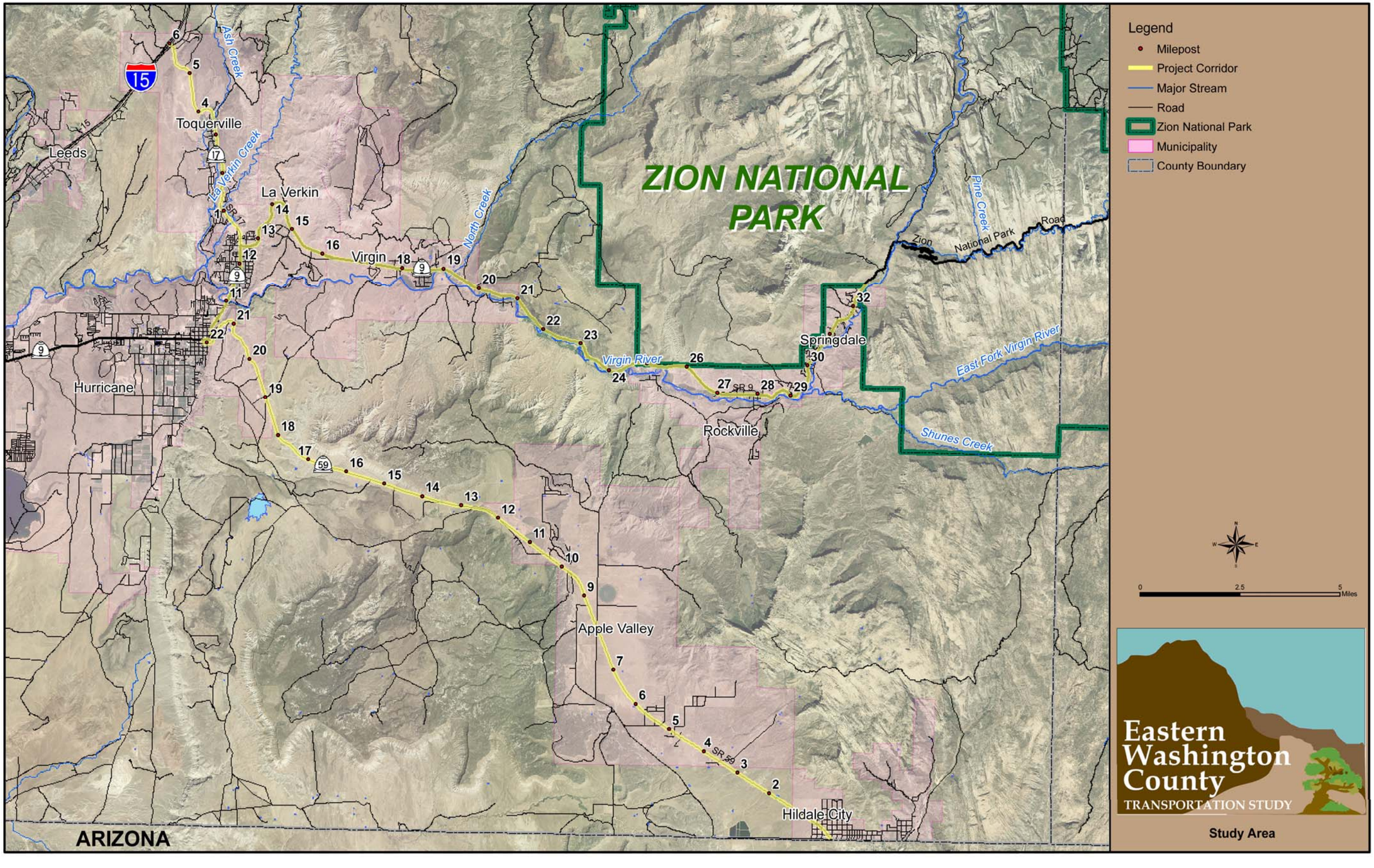
Figure 1. Study Area



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1.2 Study Process

The corridor study process involved three phases. The first phase focused on gathering information about existing highway conditions, environmental resources in the area, and current land-use patterns. In the second phase, UDOT reviewed future population and traffic projections that would affect how the highways function and that would require highway improvements. Finally, UDOT used the information gathered in the first two phases to complete the third phase, which consisted of identifying a "vision" for the corridors and then developing and ranking a list of improvement projects that would help UDOT meet this vision. This study report focuses on the third phase—the improvement project list—but also summarizes the results of the first two phases.

1.3 Vision, Goals, and Objectives

As part of the corridor study process, UDOT formed a vision for the EWCTS corridors and identified goals that support this vision.

1.3.1 Vision

The state routes that are included in the EWCTS area (SR-9 from Hurricane to Springdale, SR-17, and SR-59) should provide a safe travel route for local, regional, and through traffic to meet personal and commercial needs.

- Corridor design should accommodate the needs of all travel types including passenger vehicles, recreational vehicles, bicycles, and pedestrians as well as the unique requirements of large trucks.
- The corridor should have enough capacity to minimize congestion and facilitate traffic operations.
- Roadway features should be designed and constructed to accommodate safe access onto and off of the highways for all vehicle types and sizes.
- The corridors should be designed and managed to minimize impacts to and enhance the adjacent natural and human environments.

1.3.2 Goals and Objectives

Goal 1: Transportation facilities should be reasonably safe for users.

To achieve this goal, UDOT should focus on:

- Adequate number and length of passing lanes
- Adequate number of safe pull-outs
- Intersection treatments as needed
- Striping and signing as needed
- Standard shoulder widths
- Intelligent transportation system (ITS) technology as needed
- Rumble strips
- Roadway geometry
- Bicycle and pedestrian considerations
- Parking restrictions

Goal 2: Operational and capacity improvements should minimize delay and improve safe and efficient movement of traffic.

To achieve this goal, UDOT should focus on:

- Adequate number of travel lanes for expected volumes
- Adequate number and placement of auxiliary/turn lanes
- Adequate sight distance
- Maintenance of existing surfaces and structures
- Adequate lane and shoulder width

Goal 3: Incorporate roadway improvements to balance regional traffic flow and reasonable access to land development.

To achieve this goal, UDOT should focus on:

- Access control
- Corridor Agreements with local governments
- Developer responsibility for design and build of appropriate intersection/interchanges to access the state highway
- Coordinated land-use planning with local government agencies
- Maintenance of regional traffic flow

Goal 4: Corridor design should minimize impacts and enhance benefits to the natural and human environments where possible.

To achieve this goal, UDOT should:

- Implement context-sensitive solutions (CSS) that minimize impacts and enhance the natural and built environments
- Minimize impacts to adjacent natural, physical, archaeological, historical, cultural, and human resources
- Include opportunities for public involvement during project planning

1.4 Document Organization

This corridor study report includes the following sections:

Section 1.0: Introduction

Section 2.0: General Description of the Study Corridors

Section 3.0: Future Conditions in the Study Area

Section 4.0: Public Involvement

Section 5.0: Project Identification and Recommendations

Section 6.0: Implementation Plan and Cost Estimates

Section 7.0: References

2.0 General Description of the Study Corridors

In recent years, Washington County has experienced rapid growth and changes in the locations where people are living in the county. Overall, recent county growth has mostly been a result of migration from other areas of the state and from outside Utah. Although the county has a reputation for attracting people from outside Utah, data show that most recent (2004 through 2006) "moves" in Washington County were a result of existing county residents moving within the county. Between 2004 and 2006, 53% of moves in the county were existing residents relocating within the county. During this same period, in-migration from outside of Utah accounted for about 25% of all moves, and migration from other counties in Utah made up about 23% of all moves (U.S. Census Bureau 2005, 2006). Many of the inter-county moves were residents moving from larger communities, such as St. George, to developing areas or communities that have traditionally been much smaller, such as Hurricane.

Washington County will probably continue to grow more quickly than most other counties in Utah due to its location, amenities, and weather. Local and state governments recognize that growth will lead to new and expanded pressures on resources and infrastructure. These governments recently began collaborative long-range planning to create a blueprint for the county's future. The most notable recent effort is the Vision Dixie process, which was completed in 2007.

UDOT selected three rural highways in eastern Washington County for study because of recent and expected growth along the highways and because of the highways' proximity and connections to other parts of this growing region. Through the EWCTS, UDOT hopes to continue the regional planning emphasis by reviewing existing and future needs in eastern Washington County.

This section reviews the existing environmental and road conditions along the study corridors. The study corridors pass through several small cities and towns, including Hurricane (SR-9 and SR-59), La Verkin (SR-9 and SR-17), Virgin (SR-9), Rockville (SR-9), Springdale (SR-9), Toquerville (SR-17), Hildale (SR-59), and Apple Valley (SR-59). Some of these communities, such as Hurricane and Apple Valley, anticipate extensive growth during the EWCTS planning period (through 2035). Others, such as Rockville, expect growth to be slow.

2.1 Environmental Setting

The EWCTS area is located in an area known as the Dixie Basin. The Dixie Basin is situated in a transition zone where the Basin and Range and the

Colorado Plateau physiographic provinces meet. The study area includes scenic rock formations (such as cliffs and mesas), the Virgin River, and wide expanses of colorful desert landscape. Zion National Park, probably the most well-known landmark in the area, lies on the eastern edge of the study area.

The following sections summarize land use and the natural environments along the corridors.

2.1.1 General Conditions Common to All Corridors

Cultural Resources

The EWCTS did not include detailed records searches or surveys for cultural resources. Instead, this report describes the cultural resource environment using an approach that was successfully used for the *Southern Corridor Draft Environmental Impact Statement and Section 4(f) Evaluation* (UDOT and FHWA 2003).

Because the number and location of historic and archaeological sites and the presence of paleontological resources are unknown, it is difficult to anticipate how such sites and resources could be affected by road improvement projects along SR-9, SR-17, and SR-59. To provide an estimate of potential sites, an average number of archaeological sites per acre was developed based on the intensive-level pedestrian (walking) survey conducted for the Southern Corridor project. That survey, which studied about 4,000 acres, found that the average site density is 0.032 sites per acre (this includes National Register–eligible and non-eligible sites). Table 2-1 shows the expected number of sites that are likely present along each highway segment.

Table 2-1. Expected Archaeological Resource Sites along the Study Highway Segments

Highway	Length of Study Segment (miles)	Potential Area of Impact (acres)[a]	Expected Number of Sites in Potential Area of Impact[b]
SR-9	22	3,520	113 sites
SR-17	6	960	31 sites
SR-59	22	3,520	113 sites

[a] The potential area of impact assumes that modifications would be made to the mainline highway only and would be completed within a one-quarter-mile "strip" with the highway as the centerline.

[b] Density of 0.032 sites per acre multiplied by the number of acres potentially affected.

The site density method focuses on archaeological sites only. A number of properties are listed on the National Register of Historic Places in this part of Washington County (especially in Zion National Park), but a complete survey for properties that are eligible but not listed would need to be completed in support of any construction project. Given the historic nature of towns along the highways, it is likely that eligible historic structures are present in these towns. Other potentially historic features, such as farmsteads and historic travel routes, are probably also present along the highways. These types of cultural resources would also be considered according to Section 4(f) of the U.S. Department of Transportation Act of 1966.

Finally, southern Utah is rich in paleontological resources, and it is likely that paleontological resources are present along segments of all study highways.

Special-Status Soils

The Natural Resources Conservation Service (NRCS) identifies soils that can support prime farmland. Because soil types are generally not specific to any one area along the study highways, this study considers the distribution of prime farmland soils.

NRCS makes determinations regarding the applicability of the Farmland Protection Policy Act (FPPA) and the conversion of prime farmland, unique farmland, and farmland of statewide or local importance. According to the text of the act, the FPPA generally does not apply to land that is already committed to urban development or that supports densities of at least 1.3 structures per acre. Some of the areas that support prime farmland soils along the study corridors are within incorporated areas that are already developed. It is unlikely that NRCS would seek to apply the FPPA in these areas.

Hydric soils can provide clues about the potential presence of wetlands, so hydric soils are also considered special-status soils.

Table 2-2 below summarizes the distribution of special-status soils along the study corridors. Special-status agricultural soils that are within developed areas (and thus exempt from the FPPA) are included in the table and are noted as such.

Table 2-2. Special-Status Soils along the Study Highway Segments

Soil Name	Status	General Locations
Clovis fine sandy loam, 1% to 5% slopes	Prime farmland if irrigated	• One of the dominant soil types between about Milepost (MP) 8 and MP 12 on SR-59 (much of this is within the incorporated town of Apple Valley) • Minor occurrences along SR-17 where Ash Creek and La Verkin Creek cross the road (incorporated areas of Toquerville and La Verkin) and on SR-9 at about MP 18 and MP 25
Fluvaquents and torrifluvents, sandy	Hydric	• One of the dominant soil types between about MP 18 and MP 31 on SR-9 (some in incorporated areas) • Minor occurrences at about MP 1 on SR-17 (incorporated area of Toquerville) and MP 9–10 on SR-59
Harrisburg fine sandy loam, 1% to 5% slopes	Prime farmland if irrigated	• Isolated occurrence at about MP 10 on SR-9 in Hurricane (incorporated area)
Laverkin fine sandy loam, 2% to 5% slopes	Prime farmland if irrigated	• Limited distribution along SR-17 at about MP 1 (incorporated area of La Verkin)
Laverkin silty clay loam, 1% to 2% slopes	Prime farmland if irrigated	• Concentrated at confluence of Virgin River and La Verkin Creek at about MP 12 on SR-9 (incorporated area of La Verkin)
Leeds silty clay loam, 0% to 1% slopes	Prime farmland if irrigated	• Concentrated at confluence of Virgin River and La Verkin Creek at about MP 12 on SR-9 (incorporated area of La Verkin)
Leeds silty clay loam, 1% to 2% slopes	Prime farmland if irrigated	• Concentrated near the intersection of SR-9 and SR-59 in Hurricane (incorporated area of Hurricane)
Leeds silty clay loam, 5% to 10% slopes	Prime farmland if irrigated	• Concentration between MP 12 and MP 13 on SR-9 (incorporated area of La Verkin) • Minor occurrences at about MP 10 along SR-9 (incorporated area of Hurricane)
Naplene silt loam, 2% to 6% slopes	Prime farmland if irrigated	• Concentrated along SR-9 between MP 30 and MP 33 (incorporated area of Springdale) • Pockets along other areas of SR-9 at about MP 19 and MP 28
Palma fine sandy loam, 1% to 5% slopes	Farmland of statewide importance	• One of the dominant soil types between about MP 6 and MP 8 on SR-59; spot occurrences at about MP 18 on SR-59 and MP 18 on SR-9
Redbank fine sandy loam, 1% to 5% slopes	Prime farmland if irrigated	• Concentrations along SR-59 at about MP 2, MP 4–5, MP 8, and MP 11 through MP 15 • Pockets at about MP 19 on SR-9 and MP 6 on SR-17 (incorporated area of Toquerville)
Redbank silty clay loam, 0% to 2% slopes	Prime farmland if irrigated	• One of the dominant soil types between about MP 18 and MP 30 on SR-9 (some in incorporated areas)
Riverwash	Hydric	• Along SR-17 between MP 3 and MP 4 (incorporated area of Toquerville)
Tobler fine sandy loam	Prime farmland if irrigated	• Pockets along SR-17 between MP 0 and MP 2 (incorporated area of La Verkin)
Tobler silty clay loam	Prime farmland if irrigated	• Pockets along SR-17 at about MP 1 (incorporated area of La Verkin) and MP 4 (incorporated area of Toquerville)

Source: Natural Resources Conservation Service 2007

Wildlife Connectivity

UDOT's report titled *Wildlife Connectivity Across Utah's Highways – Updated* (UDOT 2007a) does not identify any of the segments of SR-9, SR-17, or SR-59 that are being evaluated as part of this study as having critical, high, or moderate importance to wildlife connectivity for any species (fish, mammals, amphibians, reptiles, or birds).

2.1.2 Conditions and Resources along SR-9

In the study area, SR-9 travels through the developed cities of Hurricane and La Verkin and through the small towns of Virgin, Rockville, and Springdale. Most of the 22-mile-long segment travels through undeveloped and scenic land under private ownership and land that is administered by the Bureau of Land Management and the Utah School and Institutional Trust Lands Administration (SITLA; see Table 2-3 and Figure 2 below). The highway generally follows the Virgin River and leads to the western entrance to Zion National Park.

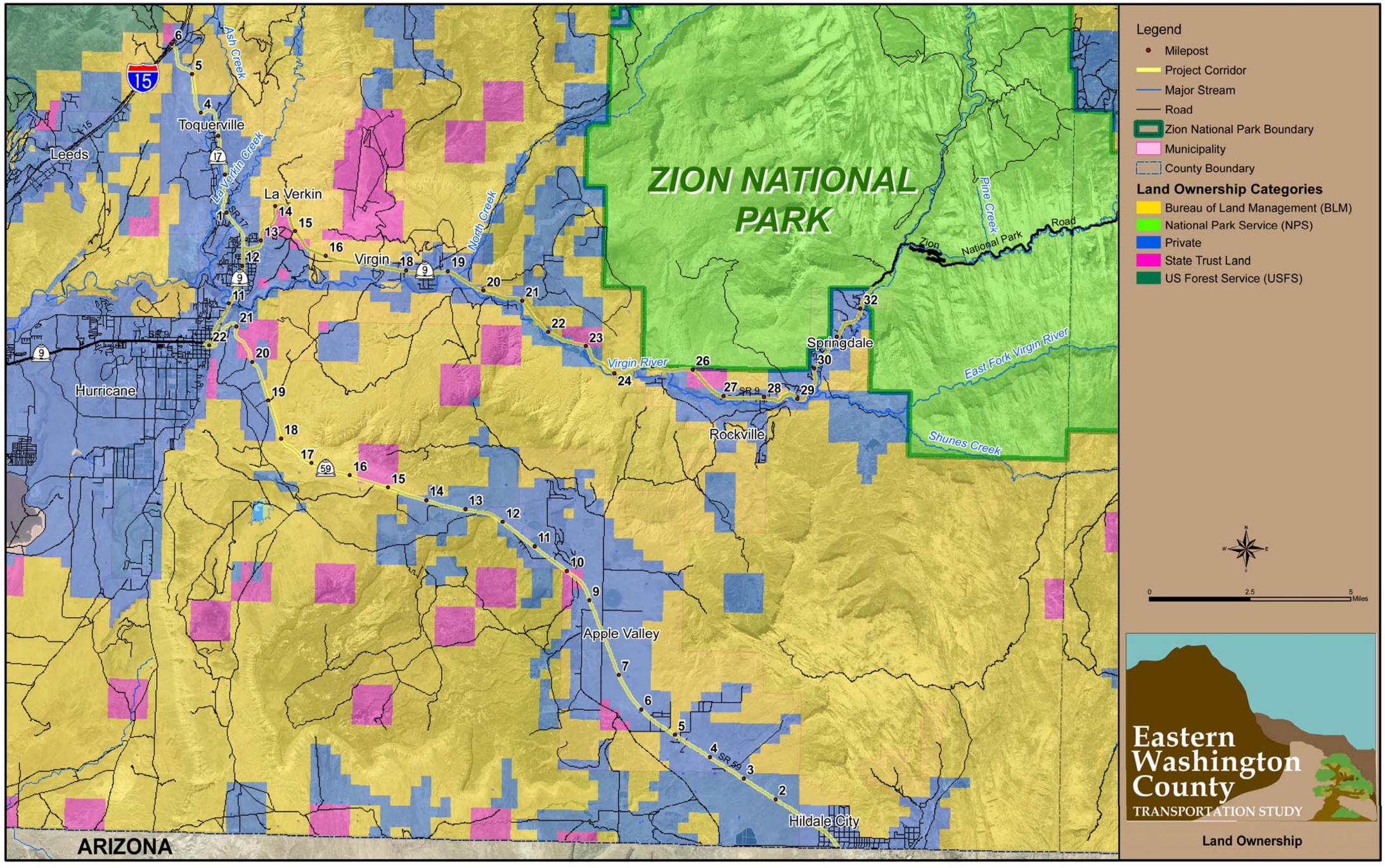
Table 2-3. Land Ownership along SR-9

Owner		Land Owned within 500 Feet of Highway Centerline[a]
Federal government		26.4%
Bureau of Land Management (BLM)	23.7%	
National Park Service	2.7%	
State of Utah		
School and Institutional Trust Lands Administration (SITLA)		9.4%
Private		64.2%
Total		**100.0%**

Source: AGRC 2008

[a] Does not include UDOT-owned right-of-way.

Figure 2. Land Ownership



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Land Use

The segment of SR-9 that is being evaluated as part of this corridor study begins at about MP 10 in Hurricane. The specific land uses along the corridor vary depending on the level of development. The highway travels north through a light industrial/commercial area on the north end of Hurricane. Land use transitions to residential and some commercial development as the highway enters La Verkin. Past the intersection of SR-9 and SR-17, land uses along SR-9 quickly transition to sparsely developed and then undeveloped land as the highway travels east. The La Verkin land-use plan (City of La Verkin, no date) shows commercial uses surrounding the intersection of SR-9 and SR-17 with a transition to residential uses south of SR-9 and recreational uses north of SR-9 as the highway travels east and to the "top side," or western part, of the city. Much of the top side is designated for future planned community development (City of La Verkin, no date).

As SR-9 exits La Verkin, the land remains mostly undeveloped until SR-9 approaches the town of Virgin at about MP 18. This historic community is characterized by sparse, older, low-density residential development. The Zion River Resort RV (Recreational Vehicle) Park is at the eastern end of town.

East of Virgin, SR-9 travels past rural residential development and agricultural land along the Virgin River (which is south of the highway) and undeveloped areas both along both sides. SR-9 enters the town of Rockville, the least-populous municipality along any of the study corridors, at about MP 27. Rockville is primarily a small, residential community that does not have a developed commercial core. Outside the town center, Rockville's established residential areas primarily support large-lot, single-family residences. The patterns and amount of growth anticipated for Rockville are not expected to change or increase substantially during the EWCTS planning period (HDR 2008).

Rural residential development continues as SR-9 leaves Rockville and travels toward Springdale. Located at the entrance to Zion National Park, Springdale caters to tourists and has many modern motels, inns, and small businesses. Springdale is a small city, and development is focused along the highway. There are older residential developments alongside newer developments. The Springdale zoning map (Town of Springdale 2007) shows commercial uses clustered along the highway with some higher-density residential uses.

Geology and Soils

This section of SR-9 runs east-west along the north side of the Virgin River. The geology of this section is characterized by Hurricane Mesa, Kolob Plateau, and the mountains of Zion National Park to the north and by the Gooseberry Mesa and Canaan Mountain to the south. Zion National Park, which surrounds the eastern end of this segment, includes very large erosional forms in white Jurassic cliffs that were carved by the Virgin River (Hintze 1974; Stokes 1986; UGS 2004).

The landslide susceptibility map for Utah (Giraud and Shaw 2007) shows areas of low to moderate susceptibility in the vicinity of La Verkin and at other isolated points all the way to the east end of the SR-9 study area in Springdale. There are some areas of high susceptibility (existing shallow and deep landslides) south of SR-9 near Springdale, but these areas are not immediately adjacent to the highway.

This section of highway runs through soils that are identified as prime farmland if irrigated. Some of these areas, such as those along the highway in Springdale, might not be subject to the provisions of the FPPA because of the level of development.

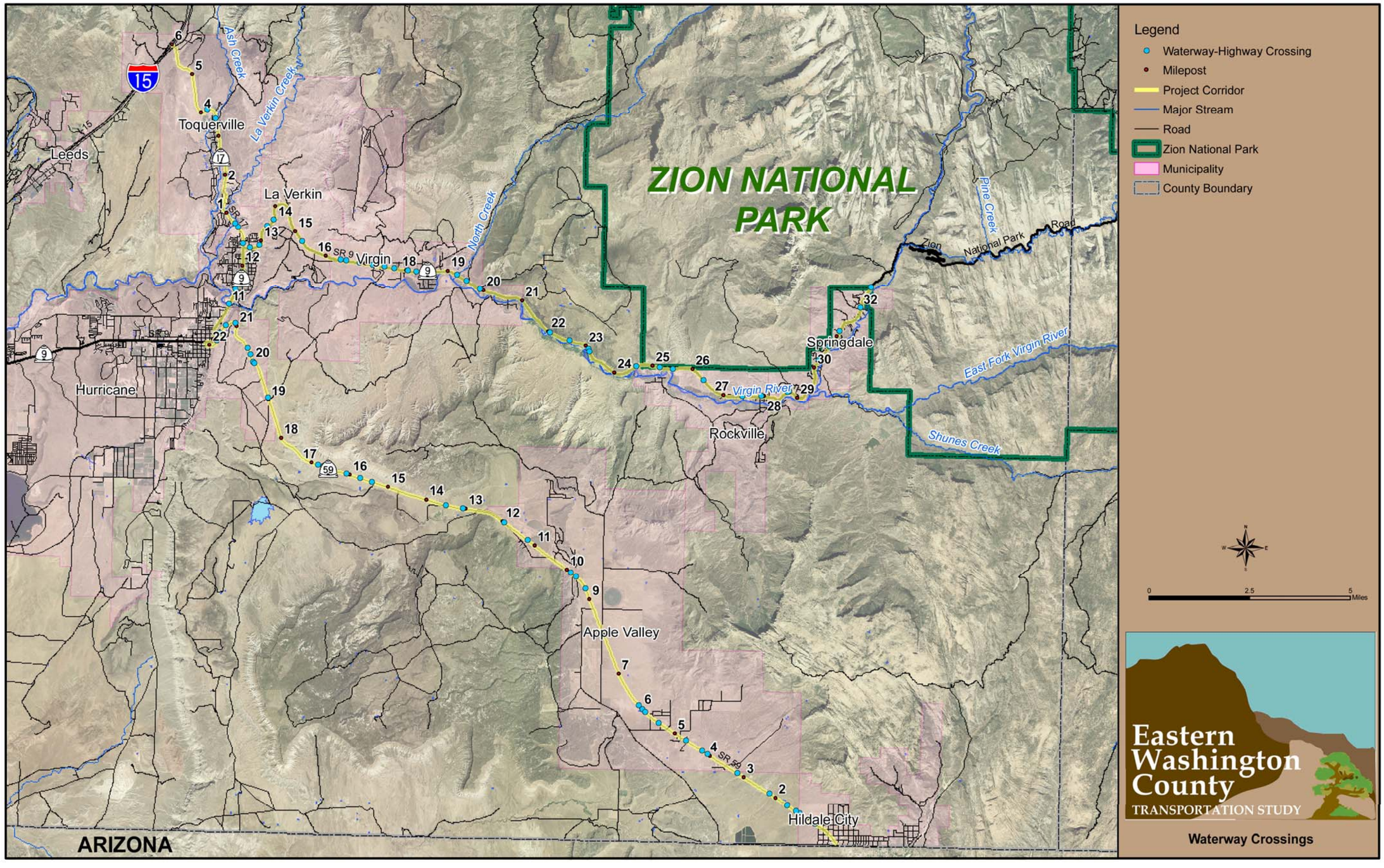
Water Resources

The highway crosses the Virgin River at about MP 11 on the north end of Hurricane. After its intersection with SR-17, SR-9 parallels the Virgin River to the end of the study segment at about MP 33. The East Fork of the Virgin River flows into the main fork at about MP 29.

SR-9 crosses more than 30 washes and creeks along this segment, many of which are unnamed (see Figure 3 below). The road crosses floodplains of the Virgin River that have been mapped by the Federal Emergency Management Agency (FEMA) at about MP 18.3, a feature called The Wash at about MP 18.6, North Creek at about MP 19.2, unnamed tributaries to the Virgin River at about MP 21 and MP 31, and Blacks Canyon at about MP 32. Two water bodies along this section of SR-9 are identified as impaired under Section 303(d) of the federal Clean Water Act: North Creek (and its tributaries) from its confluence with the Virgin River to its headwaters and the Virgin River at the Springdale Wastewater Treatment Facility (EPA 2008).

A natural resources “windshield” (drive-through) survey completed for the EWCTS (HDR 2007) found that limited wetland areas are common in the floodplains associated with North Creek, the Virgin River, and the East Fork of the Virgin River.

Figure 3. Waterway Crossings



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Fish and Wildlife Resources

Because of the highway's proximity to the Virgin River, the 2003–2005 wildlife strike data for this stretch of SR-9 show a concentration of vehicle-animal strikes, although the total number of recorded strikes is still not substantial (a total of about 10 strikes over the 2-year period).[1] The locations of the recorded wildlife strikes are in areas that appear to be most suitable for deer and elk migration, which are along the Virgin River in the narrow canyon through Virgin and in the town of Springdale.

The windshield survey found that the entire length of SR-9 has nesting and foraging cliff habitat[2] for raptors (see Figure 4 below). The survey report specifically mentions habitat for Mexican spotted owl, peregrine falcon, and California condor around MP 32. Other special-status species that are or might be present along this section of SR-9 include desert tortoise in and around the city of Springdale, several fish that occur only in the Virgin River, southwestern willow flycatcher in riparian areas along the Virgin River, and Arizona toad. Bats could use the bridge over the Virgin River at MP 11 for roosting.

Habitat for sensitive plant species is present on gypsiferous, unstable clay soils derived from the Chinle and Moenkopi formations. The windshield survey found that these soils are present along SR-9 between about MP 25.5 and MP 27. These soils appear as white foothills on the north side of the highway.

Section 4(f) and Section 6(f) Resources

Section 4(f) of the Department of Transportation Act applies to "publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance."

A number of publicly owned recreation areas would be subject to the conditions of Section 4(f) if they are affected by the construction of a federally funded project. These recreation areas include a baseball field/park in La Verkin at about MP 11.8, a Zion National Park trailhead (Coalpits Wash) at about MP 25.3, a park in Springdale at about MP 30, and the Zion National Park entrance station and facilities at the corridor terminus at about MP 33.5.

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[1] These data account only for recorded or reported wildlife strikes. While the actual number of strikes might be higher than reported, the locations of recorded strikes can indicate areas where wildlife crossings could cause conflict.

[2] The term *habitat* in this report means habitat that is suitable for a particular species but that does not necessarily have current populations of that species.

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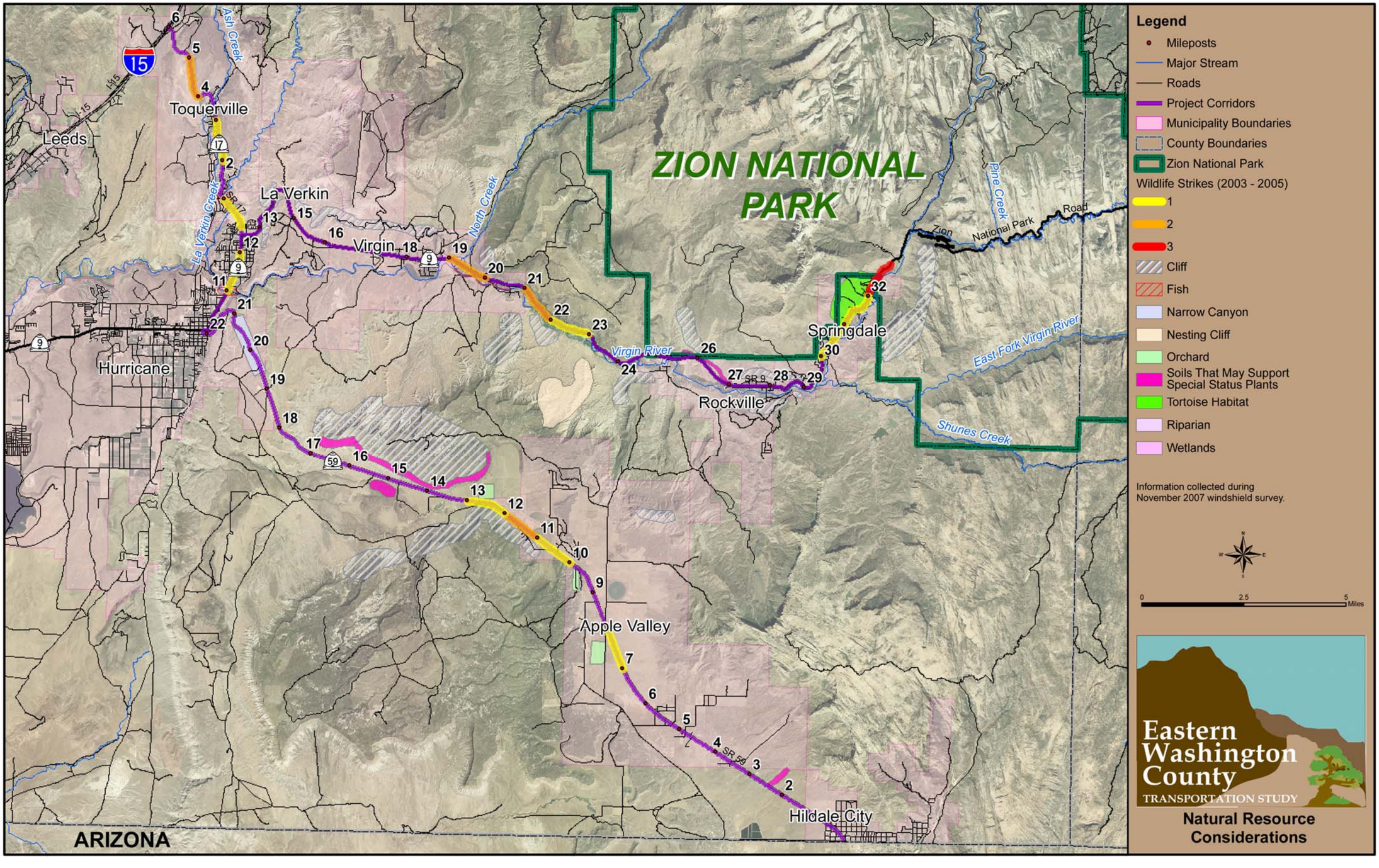
Figure 4. Natural Resource Considerations



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There are also a number of properties listed on the National Register of Historic Places near the eastern end of the study segment in Zion National Park. One of these properties, the South Entrance Station, is situated at the terminus of the study segment; other properties are outside the study limits. The Deseret Telegraph and Post Office property, which is in Rockville, is also included on the National Register. Other listed properties, including the Rockville Bridge in Rockville and the James Jepson House in Virgin, are probably far enough from the highway that any construction along SR-9 would not affect these resources. There are also several historic buildings in all of the communities along SR-9 that might be eligible for listing on the National Register and therefore subject to regulation under Section 4(f).

State and local governments often obtain grants to acquire or make improvements to parks and recreation areas through the federal Land and Water Conservation Fund Act of 1965 (16 United States Code [U.S.C.] Sections 4601-4 through 4601-11, September 3, 1964, as amended). Section 6(f) of this act prohibits the conversion of property acquired or developed with these grants to a non-recreational use without the approval of the U.S. Department of the Interior's National Park Service. Section 6(f) directs the Department of the Interior to ensure that replacement lands of equal (monetary) value, location, and usefulness are provided as conditions to such conversions. There are no Section 6(f) resources along SR-9 (National Park Service 2008).

2.1.3 Conditions and Resources along SR-17

SR-17 is the shortest highway segment studied as part of the EWCTS. The segment begins at the intersection of SR-17 and SR-9 in La Verkin and travels north for about 6 miles through Toquerville to Anderson Junction at I-15. All land along SR-17 is within the incorporated areas of La Verkin and Toquerville, although some land along the corridor is under federal and state ownership (see Table 2-4 below and Figure 2 above, Land Ownership).

Table 2-4. Land Ownership along SR-17

Owner	Land Owned within 500 Feet of Highway Centerline[a]
Federal government	
BLM	6.5%
State of Utah	
SITLA	1.3%
Private	92.2%
Total	**100.0%**

Source: AGRC 2008

[a] Does not include UDOT-owned right-of-way.

Land Use

SR-17 passes through developed areas associated with the cities of La Verkin and Toquerville (MP 0 through about MP 4), with some large-lot residential development between the two cities. Between the Ash Creek crossing (at about MP 3.5 on the north end of Toquerville) and I-15, the land is mostly undeveloped. Commercial and residential uses have direct access to the highway along its length. Some new residential developments are anticipated along the this segment between about MP 1 and MP 4. These developments would mostly be extensions of other recently developed areas on the edges of the two cities. Given the current access configuration, these new developments would probably also have primary accesses from SR-17.

The City of La Verkin land-use map (City of La Verkin, no date) designates the land between MP 0 and about MP 1 as suitable for future commercial and residential land uses. There are small areas of agricultural and industrial land in this area as well.

There is little commercially zoned land in Toquerville. The Toquerville zoning map (Toquerville City 2006) shows neighborhood commercial uses at the south end of town along SR-17 and highway commercial on the north end of town where SR-17 intersects I-15. Land along the west side of SR-17 though the center of Toquerville is designated for single-family residential uses, while land along the east side is designated for agricultural uses. Undeveloped land along SR-17 north of downtown and south of I-15 is designated for multiple uses. Recent aerial photographs of the corridor show a development pattern that is consistent with these existing zoning and land-use designations.

Geology and Soils

SR-17 runs north-south along the Hurricane Fault. This active fault trends north-south through Washington County and extends from Cedar City on the north to south of the Grand Canyon on the south (FCAOG 2008). This section of SR-17 runs along the alignment of the Hurricane Cliffs along a low-elevation break in the cliffs. The plateaus east of the Hurricane Cliffs move up (north) along the Hurricane fault zone relative to the downward (south) movement of the cities of La Verkin and Hurricane on the west side of the fault zone. The area is bounded by the Pine Valley Mountains to the west and the Smith Mesa to the east (Hintze 1974; Stokes 1986; UGS 2004).

The landslide susceptibility map for Utah (Giraud and Shaw 2007) shows areas of moderate susceptibility (areas with slopes that are prone to landsliding based on observed landslide slope angles) along the east side of SR-17 between MP 0 and about MP 4. The remainder of the corridor is generally of very low susceptibility (areas unlikely to produce landslides) or low susceptibility (areas with slopes that could produce landslides).

This section of highway runs through soils that are identified as prime farmland if irrigated, but much of this area is probably exempt from the provisions of the FPPA.

Water Resources

SR-17 crosses two named creeks, La Verkin Creek at about MP 0.5 and Ash Creek at about MP 3.5, and an unnamed wash at about MP 3.8. These creeks are typical of desert streams and primarily flow in response to storms, though there might be some intermittent flow between storms. FEMA has mapped the 100-year floodplains associated with La Verkin Creek and Ash Creek; the road crosses the mapped floodplain of Ash Creek on the north end of Toquerville and the mapped floodplain of La Verkin Creek on the south end of Toquerville. La Verkin Creek and Ash Creek are within the Virgin River watershed, parts of which are identified as impaired by pollutants under Section 303(d) of the federal Clean Water Act. La Verkin Creek and Ash Creek, however, are outside (upstream) of the areas of the watershed that are identified as impaired (EPA 2008).

The natural resources windshield survey report for SR-17 mentioned the highway's proximity to La Verkin Creek and Ash Creek and stated that both creeks have associated riparian zones and wetlands near the highway.

Fish and Wildlife Resources

The windshield survey found that La Verkin Creek and Ash Creek provide suitable habitat for several fish species that occur only in the Virgin River system and that the associated riparian areas provide habitat for the federally endangered southwestern willow flycatcher. Wildlife regularly cross SR-17 near these riparian areas and near irrigated fields in the agricultural areas of the corridor. Bats could use the bridges over La Verkin Creek and Ash Creek and the cliffs east of SR-17 for roosting.

Section 4(f) and Section 6(f) Resources

Two properties are listed on the National Register of Historic Places along SR-17: the Naegle Winery along SR-17 in downtown Toquerville and the John Steele House along SR-17 on the north end of Toquerville. Given Toquerville's history, it is likely that there are additional buildings and associated land along SR-17 that are eligible for listing on the National Register and therefore would be considered Section 4(f) resources. The City of La Verkin is planning to construct a recreational trail along La Verkin Creek that would come very close to SR-17 at about MP 0.5. There are no other potential 4(f) resources along SR-17.

There are no Section 6(f) resources along SR-17 (National Park Service 2008).

2.1.4 Conditions and Resources along SR-59

The entire length of SR-59 is in the study area. SR-59 begins at the Arizona-Utah border and ends at its intersection with SR-9 in Hurricane. About half of the land next to the highway is in the incorporated areas of Hildale (MP 0 to MP 1.5), Apple Valley (MP 3 to MP 13), and Hurricane (MP 18 to MP 22). As shown in Table 2-5 below and Figure 2 above, Land Ownership, most of the land along SR-59 is privately owned.

Table 2-5. Land Ownership along SR-59

Owner	Land Owned within 500 Feet of Highway Centerline[a,b]
Federal government	
BLM	18.6%
State of Utah	
SITLA	7.7%
Private	73.6%
Total	**99.9%**

Source: AGRC 2008

[a] Percentages do not add up to 100% due to rounding.

[b] Does not include UDOT-owned right-of-way.

Land Use

Hildale is a small town that is characterized by denser residential development in the city center. Development in Hildale and neighboring Colorado City, Arizona, generally runs together, and the area functions like a single city. SR-59 passes through the western edge of Hildale and has very little development along the corridor on the Utah side.

Currently, there are about 750 residents and 425 homes in Apple Valley (HDR 2008). A review of the Apple Valley land-use plan shows that the town expects substantial residential and commercial growth in the EWCTS planning period. Discussions with town representatives confirmed the expected growth. According to the city, several new residential subdivision developments are in the planning and engineering stages, and the town expects construction of an additional 700 to 800 homes by 2010. Other major developments expected in the next 5 years include completion of a major golf resort (currently under construction), construction of a film production facility, and construction of at least one large hotel (HDR 2008).

Accesses to two major BLM recreation areas are within the incorporated area of Apple Valley: the road to Little Creek Mesa at about MP 8.7 and the road to Gooseberry Mesa at about MP 8. These uses are not on SR-59, but maintaining the highway accesses to these important recreation areas is critical.

SR-59 approaches the Hurricane incorporated area at about MP 19. Land along this stretch of SR-59 is generally undeveloped, though there are some scattered residential estates on the cliffs above town at about MP 21. The highway intersects SR-9 on the eastern edge of the city's primary development area.

Geology and Soils

SR-59 runs northwest to southeast along a mid-elevation landform that is bounded by the Gooseberry Mesa and Vermillion Cliffs to the northeast and Little Creek Mountain and Lost Spring Mountain to the southwest. The primary geological composition of this section is Triassic rock, with Quaternary-Tertiary basalt to the southwest at the western half of this section and Quaternary rock to the northeast at the eastern half of this section (Hintze 1974; Stokes 1986; UGS 2004).

Most of the SR-59 corridor is mapped as having a very low probability for landslides (Giraud and Shaw 2007). There are areas of moderate susceptibility near the cliffs between about MP 13 and MP 17 and areas of high susceptibility east of the highway at about MP 6.

A substantial part of SR-59 runs through soils that both support farmland of statewide importance and can support prime farmland if irrigated. Even though much of the corridor runs through the incorporated area of Apple Valley, this city is sparsely developed, and agricultural soils in the incorporated areas could be subject to the provisions of the FPPA.

Water Resources

SR-59 crosses 30 creeks, washes, and drainage ditches, most of which are unnamed. SR-59 does not cross any regulatory floodplains identified by FEMA or any waters that are identified as impaired under Section 303(d) of the Clean Water Act (EPA 2008).

The windshield survey found that there are potential wetland areas between about MP 9 and MP 12 in Apple Valley and in the canyon approaching Hurricane between about MP 19 and MP 21.

Fish and Wildlife Resources

The 2003–2005 wildlife strike data for SR-59 show some incidents in the northern part of Apple Valley, though the numbers are not high (a total of five strikes recorded over the 2-year sampling period). A higher incidence of vehicle-wildlife incidents would be expected here given the presence of food and water (irrigation) associated with agriculture in the valley.

The windshield survey found that there is cliff habitat suitable for nesting raptors between about MP 9 and MP 19 (see Figure 4 above, Natural Resource Considerations). The creeks and other drainages along SR-59 do not provide

suitable habitat for any of the sensitive fish species that occur only in the Virgin River and its tributaries.

Suitable habitat (that is, soils) for sensitive plant species is present along SR-59 between about MP 13 and MP 17 (on the gray foothills on the north side) and at about MP 2.5 (on the purple outcropping north of the highway).

Section 4(f) and Section 6(f) Resources

There are no publicly owned parks along SR-59. The National Register of Historic Places includes two properties in Hurricane that are near the intersection of SR-59 and SR-9: the Hurricane Historic District and the Bradshaw House at 85 S. Main Street.

There are no Section 6(f) resources along SR-59 (National Park Service 2008).

2.1.5 Population and Employment

Population

In March 2008, the U.S. Census Bureau released its most recent population estimates for counties in Utah. According to the Bureau, Washington County is the nation's fifth-fastest-growing county. Washington County's population grew by about 30% between 2000 and 2007. Table 2-6 summarizes the recent population growth and current estimate. As shown in the table, 2005 and 2006 were a substantial growth period for the county (nearly 40% of the 7-year growth occurred during these 2 years). Washington County's growth rate was at least or more than double that of the state during each of the 7 years shown in the table, except for 2001.

Table 2-6. Recent Population Growth in Washington County (2000–2007)

Parameter	Estimate by Year[a]								2000–2007 Change
	2000	2001	2002	2003	2004	2005	2006	2007	
Washington County population	91,259	94,636	99,467	104,324	110,372	119,224	127,310	133,791	42,532
Washington County annual growth	—	3,377 (3.7%)	4,831 (5.1%)	4,857 (4.9%)	6,048 (5.8%)	8,852 (8.0%)	8,086 (6.8%)	6,481 (5.1%)	—
State of Utah annual growth	—	2.13%	1.95%	1.56%	2.43%	3.05%	2.97%	2.55%	—

Source: U.S. Census Bureau 2008

[a] All estimates are for July 1 of the indicated year.

The Governor's Office of Planning and Budget recently released new population projections. These updated projections, which are shown in Table 2-7, summarize the most recent (2008) population projections for Washington County. As shown in the table, growth is expected to slow. However, the anticipated growth rate of Washington County is still expected to far exceed that of Utah as a whole between now and 2035.

Table 2-7. Population Projections for Washington County (2010–2035)

Parameter	Projection by Year[a]						2010–2035 Change
	2010	2015	2020	2025	2030	2035	
Population	168,078	219,324	279,864	346,408	415,510	486,315	318,237
Five-year change	—	51,246 (30.5%)	60,540 (27.6%)	66,544 (23.8%)	69,102 (19.9%)	70,805 (17.0%)	—
Washington County annual growth[b]	—	6.1%	5.5%	4.6%	3.4%	3.4%	—
State of Utah annual growth[b]	—	2.5%	2.2%	2.0%	1.8%	1.8%	—

Source: Governor's Office of Planning and Budget 2008a

[a] All population projections are for July 1 of the indicated year.

[b] Unweighted; this is the 5-year rate divided by 5.

The Governor's Office of Planning and Budget also released population growth estimates for individual cities and towns along the study corridors in May 2008 (see Table 2-8). According to city and county representatives, some of the growth projections are very inaccurate and do not show a realistic distribution across the various cities (HDR 2008).

Table 2-8. City and Town Population Projections (2010–2040)

City or Town	2010	2020		2030		2040	
	Population[a]	Population[a]	10-Year Change	Population[a]	10-Year Change	Population[a]	10-Year Change
Apple Valley	826	1,371	66%	2,036	49%	2,742	35%
Hildale	2,430	4,058	67%	6,008	48%	8,092	35%
Hurricane	16,381	27,287	67%	40,512	49%	54,568	35%
La Verkin	5,162	8,592	66%	12,756	49%	17,182	35%
Rockville	319	532	67%	789	48%	1,063	35%
Springdale	687	924	35%	1,163	26%	1,399	20%
Toquerville	1,514	2,519	66%	3,742	49%	5,040	35%
Virgin	634	1,063	68%	1,566	47%	2,109	35%

Source: Governor's Office of Planning and Budget 2008b

[a] All population projections are for July 1 of the indicated year.

Employment

The most recent employment summary from the Governor's Office of Planning and Budget estimates that there were 81,040 jobs in Washington County in January 2008. By 2035, the Governor's Office projects that the total number of jobs available will be 251,731. As shown in Table 2-9, the current employment opportunities are greatest in the Trade, Transportation, and Utilities industry. In 2035, the Trade, Transportation, and Utilities industry is expected to remain dominant but will be surpassed by employment in the Education and Health Services industry. The Construction industry is expected to remain strong through 2035.

Table 2-9. Washington County Employment (2008 and 2035)

Industry	2008	2035
Natural Resources and Mining	727	634
Construction	10,864	31,623
Manufacturing	3356	8,737
Trade, Transportation, and Utilities	17,000	39,215
Information	1,308	3,258
Financial Activity	7,723	22,820
Professional and Business Services	7,787	25,556
Education and Health Services	10,233	49,843
Leisure and Hospitality	9,345	29,268
Other Services	4,666	14,012
Government	8,031	26,765
Total employment	81,040	251,731

Source: Governor's Office of Planning and Budget 2008c

2.2 Roadway Characteristics

Even though the study highways are geographically close, each serves a distinct purpose. SR-9 provides the primary access to Zion National Park, while SR-17 is a primary connector between I-15 and SR-59. SR-59 is an important connector to Arizona and beyond that provides a main route for the movement of goods between Washington County and northern Arizona. UDOT manages the day-to-day operation and maintenance of the corridors through its maintenance station in Hurricane (Station 4522). Day-to-day activities performed through the maintenance station include removing snow, leveling lanes, sealing cracks, maintaining shoulders and drainage systems, cleaning up hazardous spills, and

repairing road and structure damage. The work overseen through the maintenance station is critical to the safe operation of all three highways.

Planning for projects that go beyond maintenance starts at the UDOT Region 4 office in Richfield. Region 4 project managers identify, plan, and oversee completion of larger projects such as highway widening. Region 4 staff members also work with staff from the UDOT headquarters to identify projects and project funding options.

A basic understanding of the current conditions of the highways is necessary in order to determine what types of future projects are needed along the highways. This section describes the existing highway geometrics, structural conditions, traffic conditions, and bicycle and pedestrian facilities of the three study corridors and reviews the transportation plans that apply to the study corridors. Potential solutions to issues or problem areas identified in this section are addressed in Section 5.0, Project Identification and Recommendations, which begins on page 75 of this report.

2.2.1 SR-9 Conditions

Highway Geometrics

Terrain

Terrain type is a factor that greatly affects roadway conditions and ultimately how roads operate. Roadway terrain is typically described as *level*, *rolling*, or *mountainous*. On level terrain, all types of vehicles can generally maintain the same speeds. On rolling terrain, the speeds of heavy vehicles (such as heavy trucks) can be substantially slower than those of passenger vehicles, but are not so slow that heavy vehicles have to operate at "crawl" speeds for long periods. Mountainous terrain causes heavy vehicles to operate at crawl speeds for significant distances or frequent intervals (TRB 2000).

Other than the 2.5 miles from the SR-9/SR-17 junction in La Verkin (MP 12.5) to the La Verkin Overlook Road (MP 15), which is a relatively steep (5% to 6%) grade, the terrain of SR-9 is generally level. Though there are some segments that could be considered rolling terrain, these segments are short enough that they do not significantly affect the operation of the highway for any extended period.

Horizontal and Vertical Alignment

Roadway alignment is the path that a roadway's centerline follows. Alignment is described in terms of horizontal and vertical planes. The combination of horizontal and vertical alignments is the primary element that controls the design

of public streets and highways. Alignment affects roadway capacity, safety, and function.

As mentioned above in the section titled Terrain, the 2.5 miles of SR-9 from its intersection with SR-17 to La Verkin Overlook Road is a steep grade. Combined with the steep grade, a few sharper horizontal curves restrict the speed limit to about 45 mph through this segment as the road climbs up the side of the hill. Once on top, the alignment straightens out for about 10 miles to the town of Rockville with more gradual horizontal and vertical curves that follow the natural features of the terrain.

From Rockville through the town of Springdale, the alignment of SR-9 becomes narrower as the road enters Zion National Park and winds its way through the more rugged terrain. The horizontal curves become sharper, and the speed limit is reduced.

Passing Opportunities

The length of SR-9 from La Verkin to Springdale, coupled with the large amount of slower recreational vehicles and out-of-area tourists, result in many drivers looking for opportunities to pass along this two-lane road. However, the combination of the horizontal and vertical alignment, the spacing of the towns, and the number of access points limit safe passing opportunities. Most of the passing zones are not very long, and the passing sight distance is limited. Motorists must also be aware of bicyclists on the shoulders and the numerous access and driveway locations along the route that can interfere with passing opportunities.

The segment of SR-9 between Virgin and Rockville has a larger-than-expected number of head-on and passing-related crashes. This suggests that motorists often want to pass in this area but there are not enough safe passing opportunities. As a result, motorists are taking unsafe risks in their attempts to pass.

Right-of-Way Width

The right-of-way width of SR-9 varies along its length between La Verkin and Springdale. In some areas, such as through the center of Rockville and Springdale, it is as narrow as 66 feet. In other areas, such as the open areas between Virgin and Rockville, it is as wide as 450 feet.

Table 2-10 shows the average right-of-way width by segment. The mileposts and right-of-way widths shown in the table are approximate and are based on the best available information from UDOT.

Table 2-10. Average Right-of-Way Width by Segment of SR-9

Segment	Average Right-of-Way Width (feet)[a]
MP 12.5 to MP 13	80–100
MP 13 to MP 17	400
MP 17 to MP 19	80–120
MP 19 to MP 20	190–330
MP 20 to MP 20.5	450
MP 20.5 to MP 24	200–320
MP 24 to MP 26.5	100
MP 26.5 to MP 28	66–130
MP 28 to MP 30	133–200
MP 30 to MP 32.5	66–100

[a] Widths estimated from best available milepost and as-built roadway plans as provided by UDOT.

Lane and Shoulder Width

The travel lanes on SR-9 are generally the width recommended by the American Association of State Highway and Transportation Officials (AASHTO), which is 12 feet. This width accommodates the wide range of vehicle types and sizes that travel this route. Turning lanes range from 10 to 14 feet wide, which also corresponds with the lane widths recommended by AASHTO.

Shoulder widths along SR-9 vary from 2 to 5 feet. This is less than the AASHTO-recommended shoulder width for this type of facility, which is 8 to 12 feet.

Structural Conditions

Pavement Condition

UDOT determines pavement condition by using the skid number, IRI HCS (international roughness index half-car simulation, a measure of ride condition), and rut depth. The classification for each of the values is directly related to corresponding range for that number. These ranges are shown in Table 2-11.

Table 2-11. Pavement Ratings and Ranges

Rating Type	Classification
Skid Number (SN)	
SN > 45	Standard
30 > SN > 45	Marginal
SN < 30	Substandard
IRI HCS	
IRI < 45	Very Good
45 < IRI < 70	Good
70 < IRI < 100	Fair
100 < IRI < 135	Poor
IRI >135	Very Poor
Rut Depth (inches)	
R < 0.1	Very Good
0.1 < R < 0.25	Good
0.25 < R < 0.50	Fair
0.50 < R < 0.75	Poor
R > 0.75	Very Poor

Source: UDOT 2001

The IRI HCS ratings for SR-9 are primarily fair and poor along the length of SR-9 in the study area with the exception of a segment between about MP 24 and MP 25, which is classified as "good" (UDOT 2008a). Table 2-12 shows the 2005 skid number and 2005 rut depth measurements for SR-9 by milepost. These measurements generally indicate good conditions along the highway, though the rut depths between about MP 28 and MP 32 indicate fair pavement condition. Deeper rutting through Springdale was reported by local residents; UDOT's data are consistent with that information.

Table 2-12. Skid Numbers and Rut Depths on SR-9

	Pavement Condition	
Milepost	Skid Number	Rut Depth
11	61	0.12
12	38	0.15
13	46	0.14
14	50	0.15
15	51	0.13
16	53	0.10
17	54	0.13
18	48	0.11
19	54	0.17
20	54	0.11
21	53	0.08
22	58	0.07
23	55	0.13
24	53	0.12
25	53	0.08
26	53	0.13
27	53	0.19
28	65	0.26
29	67	0.23
30	62	0.27
31	61	0.32
32	58	0.26

Sources: UDOT 2007b, 2007c

Drainage

Drainage along SR-9 is sheet flow off the highway into roadside ditches and is handled through cross culverts spaced periodically along the highway to convey water into the natural drainage paths. There are no specific storm drain systems or retention/detention basins along this section of SR-9.

Through the towns of Rockville and Springdale, there are areas of open-channel rock ditches adjacent to the pavement. Driveways and other access points through these areas cross over the rock ditches. The ditches carry both runoff and irrigation flows. Because they do not have curbs or other barriers separating them from the roadway, the open ditches are a safety hazard to all types of roadway users. According to Rockville Town representatives, the existing ditch and culvert system cannot accommodate runoff during very large storms (HDR 2008).

Bridge and Structure Conditions

Bridge sufficiency ratings are used to determine whether a bridge is eligible for bridge replacement and rehabilitation and can indicate the relative condition of a structure. The ratings are based on structural adequacy, compliance with current design standards, importance for public use, and eligibility for federal bridge-replacement funds. Ratings below 50 indicate that the structure should be replaced. Ratings between 50 and 80 indicate that the structure is in fair condition and that rehabilitation, if cost-effective, should be considered. Structures with ratings of 80 or higher are in good or very good condition and are not eligible for federal funding through the Highway Bridge Rehabilitation and Replacement (HBRR) Program.

There are five bridges along SR-9 in the study limits. As shown in Table 2-13, three of the bridges are rated as fair. The other two bridges are in good condition.

Table 2-13. Bridges along SR-9

Bridge Identification Number	Milepost	Sufficiency Rating	Water Feature Intersected	Bridge Type
0E 426	14.8	68.5	Dry Wash	Concrete continuous
0F 468	19.3	80	North Creek	Prestressed concrete
0F 485	25.3	80	Coal Pit Wash	Prestressed concrete
0F 82	31.5	55.2	Springdale Wash	Concrete
0E1328	32.2	75	Black Canyon Wash	Concrete

Source: UDOT 2008b

In addition to bridges, there are also a number of culverts along SR-9. In some cases, the culvert ends are very close to the road edge, which has the effect of narrowing the clear zone through those areas. This condition exists at about MP 13.1, MP 20.0, MP 20.5, MP 23.3, and MP 30.4.

Traffic Conditions

Level of Service

Horrocks Engineers evaluated the existing conditions of the EWCTS corridors. Horrocks specifically evaluated the Annual Average Daily Traffic (AADT), levels of service, truck percentages, and seasonal variations.

Horrocks based traffic level of service (LOS) calculations on the procedures in the Transportation Research Board *Highway Capacity Manual 2000* (TRB 2000). Level of service is a measure of the traveling conditions on a road, generally for aspects such as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience (TRB 2000). The Transportation Research Board defines the following six levels of service:

- A: Free flow of traffic
- B: Reasonably free flow
- C: Stable flow
- D: Approaching unstable flow
- E: Unstable flow
- F: Forced or breakdown flow

Level of service conditions for two-lane rural roads like SR-9 are typically calculated using roadway capacity and roadway demand. Specifically, level of service is defined by looking at the vehicles per day or vehicles per lane per hour and/or the percentage of time spent following other vehicles in queues and trying to pass slower-moving vehicles. Level of service is also affected by the number of lanes, terrain (such as rolling versus flat), shoulder and lane widths, access points per mile, and vehicle mix (such as percentage of heavy trucks). A level of service of E (LOS E) is generally considered to be the threshold when the roadway reaches full capacity. Table 2-14 and Figure 5 below show the existing (2006) traffic volumes and levels of service on representative segments of SR-9.

Table 2-14. Existing (2006) Levels of Service on SR-9

Begin MP	End MP	2006 AADT	Number of Lanes	2006 LOS
12.5	17.8	5,530	3	A
17.8	26.8	2,770	2	A
26.8	29.8	2,190	2	A
29.8	32.7	2,215	2	A

Source: Horrocks Engineers 2007

As shown in Table 2-14 above, current levels of service along SR-9 are free-flowing. The segments listed are in areas where the highway is two lanes (one lane in each direction). The information in Table 2-14 does not represent the level of service that would be experienced in areas where the highway is multiple lanes, has climbing or passing lanes, or travels through towns with intersections and multiple access points. Detailed analyses would be required to develop levels of service for these other areas. Because the purpose of the EWCTS is to develop a general idea of highway level of service, these additional analyses were not part of the study.

According to UDOT, in 2006, truck traffic on SR-9 made up about 9% of the daily traffic between about MP 11 and MP 18. East of about MP 18, the truck traffic made up about 17% of the total daily traffic stream. However, the vehicle classification data collected by UDOT do not readily distinguish between trucks and RVs. Due to the recreational and tourist nature of SR-9 and the fact that heavy trucks are not allowed through Zion National Park, it is generally assumed that these truck percentages consist mostly of larger recreational and tourist vehicles such as motorhomes, buses, and local delivery trucks and not heavy interstate or semi-tractor-trailer-type trucks.

Because it provides direct access to Zion National Park, SR-9 is a very tourist-oriented and recreation-oriented route. Traffic volumes on SR-9 vary greatly depending on the time of year. Traffic is only about 85% of the AADT during January when recreation and tourist activities associated with Zion National Park are low and temperatures are colder, but traffic is about 118% of the AADT during July and August when park visitation and recreation activities peak.

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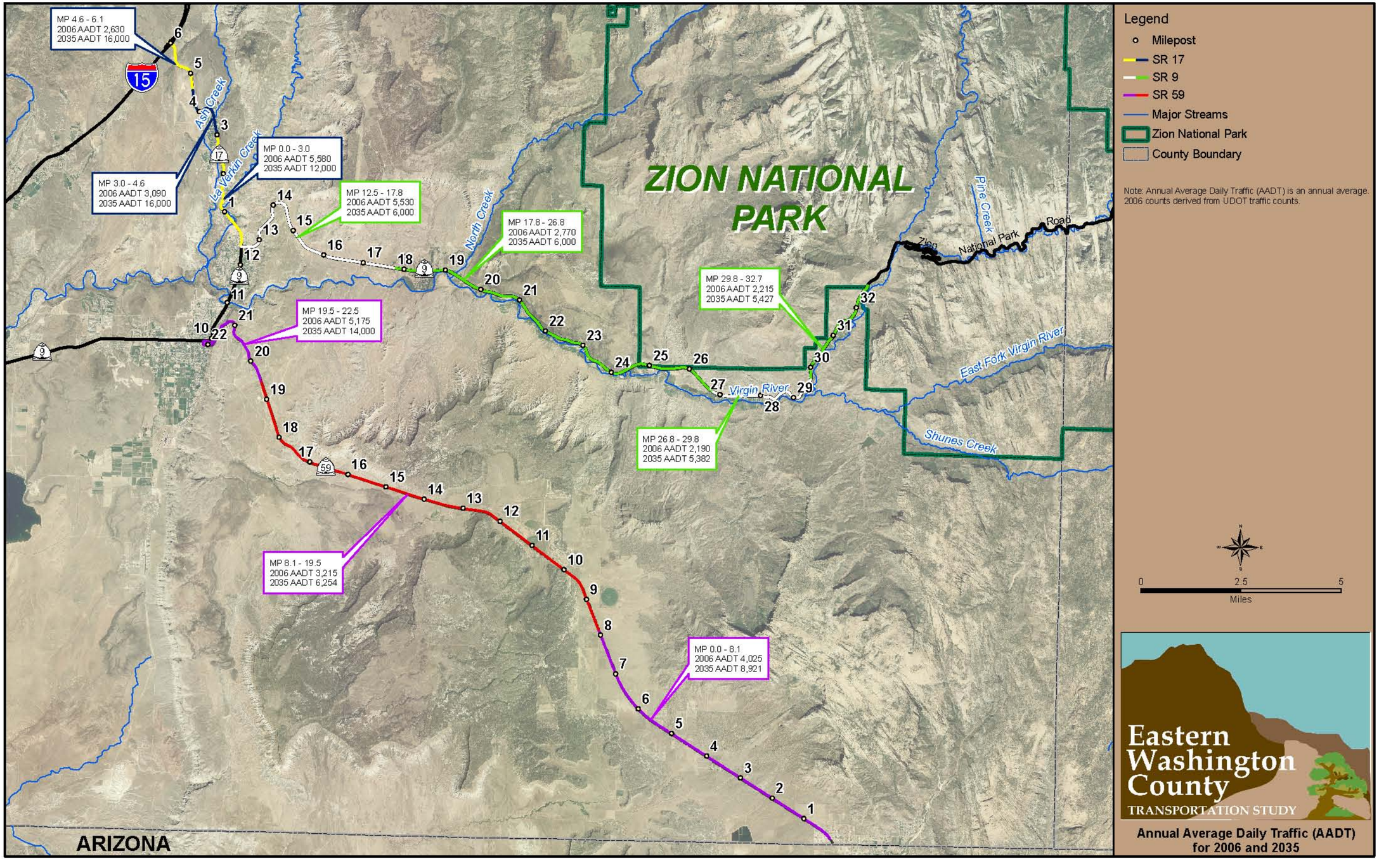
Figure 5. Annual Average Daily Traffic (AADT) for 2006 and 2035



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Access Management

Access standards and access management greatly affect the safety and operation of rural highways such as SR-9, especially where the highway intersects developed cities and towns. Table 2-15 lists UDOT's statewide access-management standards (Utah Administrative Code, Rule R930-6, Accommodation of Utilities and the Control and Protection of State Highway Rights-of-Way, January 2006). None of the corridors currently meet all of the standards shown in Table 2-15, especially along the more developed segments in cities and towns. This noncompliance is expected because these corridors were some of the first major thoroughfares in the area and have been in use for a very long time, much longer than the access-management standards have been in place. However, even though SR-9 and the other corridors might not currently meet UDOT's standards, the standards can be used to provide guidance as improvements are made and the corridors continue to develop.

Table 2-15. Access-Management Standards for State Highways

	Category	Minimum Signal Spacing (feet)	Minimum Street Spacing (feet)	Minimum Access Spacing (feet)	Minimum Interchange to Cross Road Access Spacing (feet)		
					Standard A: to 1st R-in R-out[a]	Standard B: to 1st Intersection[b]	Standard C: from Last R-in R-out[c]
1	Interstate/ Freeway	Freeway/Interstate Standards Apply					
2	System Priority Rural	5,280	1,000	1,000	1,320	1,320	1,320
3	System Priority Urban	2,640	No unsignalized access permitted		1,320	1,320	1,320
4	Regional Rural	2,640	660	500	660	1,320	500
5	Regional – Priority Urban	2,640	660	350	660	1,320	500
6	Regional Urban	1,320	350	200	500	1,320	500
7	Community Rural	1,320	300	150	NA	NA	NA
8	Community Urban	1,320	300	150	NA	NA	NA
9	Other	1,320	300	150	NA	NA	NA

Source: Utah Administrative Code, Rule R930-6

[a] Standard A refers to the distance from the interchange off ramp gore area to the first right-in/right-out driveway intersection.

[b] Standard B refers to the distance from the interchange off ramp gore area to the first major intersection.

[c] Standard C refers to the distance from the last right-in/right-out driveway intersection to the interchange on ramp gore area.

Table 2-16 summarizes the current access categories for SR-9 in the study area. UDOT expects that, as the corridor is improved and developed, the access management will be improved as well. Additionally, access categories are expected to change as the highway is modified and improved over time, which will also affect the standards that need to be implemented.

Table 2-16. Access-Management Categories for SR-9 in the Study Area

Begin MP	End MP	Category
7.9	12.7	Regional Priority Urban
12.7	17.8	System Priority Rural
17.8	18.9	Regional Rural
18.9	26.7	System Priority Rural
26.7	27.3	Regional Rural
27.3	32.7	Regional Urban

Source: UDOT 2006a

Safety

Horrocks Engineers completed a safety audit of SR-9 in February 2008 (Horrocks Engineers 2008). The following recommendations are based on general observations of the highway.

- The crash *frequency* on SR-9 is less than expected, but the crash *severity* is considerably higher than expected compared to similar roads in Utah.
- Newer-style rumble strips are not present along much of SR-9. Shoulders along SR-9 are about 2 to 5 feet wide. New standard rumble strips should be added.
- Passing sight distance is a concern in areas where passing is permitted between Virgin and Rockville (about MP 18 through about MP 27); the terrain and geometry of the roadway appear to prohibit safe passing. The crash history shows a large number of head-on and passing-related collisions in this area. The ideal solution would be to have a four-lane roadway between Virgin and Rockville (from about MP 18 to about MP 27).
- Raised pavement markers would help delineate the roadway for the last 6 miles where there is winding road geometry.
- There have been many crashes reported between MP 27 and MP 33, where the road geometry has sharp horizontal and vertical curves combined with numerous access points. It is likely that vehicles are traveling too fast for the conditions and that drivers are not aware of the geometry.

The crash history for SR-9 shows 114 crashes for 2002 to 2005, or an average of 28.5 crashes per year. The average accident rate on the highway is 0.75 accidents per million vehicle-miles traveled, which is less than the expected value of 1.46 (the *expected value* is what is expected for similar types of roads in Utah). The severity index is an average of 2.00, which is higher than the expected index value of 1.70.

The most frequent accident type over the 4-year period was single-vehicle collisions; 60 (53%) of the crashes involved only a single vehicle. The second-most-frequent accident type was rear-end collisions, which consisted of 14 crashes (12%). The other crashes varied among 14 other accident types.

From 2002 to 2005, 25 crashes were run-off-the-road crashes and 17 involved vehicles hitting animals.

The distribution of accident severity over the 4-year period was as follows:

- Non-injury: 61
- Possible injury: 15
- Injury: 14
- Incapacitating injury: 23
- Fatal: 1

Bicycle and Pedestrian Facilities

SR-9 from La Verkin to Springdale is a popular route for recreational bicycling even though it does not have formal bicycle lanes or bikeways. Residents of the towns along this part of SR-9 also ride within town and between towns along the highway. The part of SR-9 that passes through Hurricane and La Verkin has sections of sidewalk available for pedestrian use, but the sidewalk is not continuous. In La Verkin, children often ride their bicycles on the sidewalk.

According to the Utah Bicycle Suitability Map (UDOT 2004a), the shoulder of SR-9 is between 2 and 4 feet wide from the intersection with SR-59 to just east of the intersection with SR-17 (through the top of the "Twist"). East of this point, the shoulders are generally at least 4 feet wide except through Virgin and through Rockville and Springdale, where shoulders are often less than 2 feet wide. The City of Springdale and UDOT recently completed a feasibility study for construction of a bicycle and pedestrian trail between Springdale and Rockville, but construction of the trail is not fully funded. SR-9 does not have any special restrictions for bicycle use in the study area.

Because sidewalks are not present along most of SR-9, pedestrians often walk along the roadway shoulder. Pedestrians commonly use the shoulder in

Springdale due to the town's proximity to Zion National Park and facilities that cater to tourists. The bridge over the Virgin River in La Verkin has a pedestrian walkway on its east side but lacks a walkway on its west side. The City of La Verkin has noted safety problems with pedestrians' opportunities to cross SR-9 to safely access the eastern pedestrian walkway.

2.2.2 SR-17 Conditions

Highway Geometrics

Terrain

Through the town of La Verkin, the SR-17 terrain is level and representative of a standard municipal-type road that is generally flat. From La Verkin through the town of Toquerville to the junction of I-15, the road passes through a combination of level and rolling terrain. Just north of Toquerville, there is a segment that has steeper grades, though most grades along the corridor are not steep or long enough to be considered mountainous terrain.

Horizontal and Vertical Alignment

Through the town of La Verkin, the alignment of SR-17 is generally straight and flat with very little variation in horizontal or vertical alignment. Between La Verkin and Toquerville, the alignment has more horizontal and vertical curvature as the road bends around hillsides and roadside features and crosses over the La Verkin Creek. Some of these horizontal curves are sharp enough to warrant a sign that warns of a reduced-speed curve. The segment between Toquerville and I-15 has the most vertical changes in elevation as the road climbs over a steeper ridgeline. There are also a few sharper horizontal curves in this area.

Passing Opportunities

There are few passing opportunities along SR-17. Because the segments through the towns do not allow passing, only short segments between La Verkin and Toquerville and between Toquerville and I-15 allow passing. However, the combination of horizontal and vertical alignments in these segments makes passing difficult and risky, especially during peak travel periods. For these reasons, vehicles do not pass often on SR-17.

Right-of-Way Width

UDOT's available right-of-way information for SR-17 is limited. However, this limited information indicates that most of the SR-17 right-of-way between SR-9 and I-15 is between 66 and 90 feet wide. A few areas have a right-of-way as narrow as 50 feet and as wide as 400 feet, but these areas are typically only a few hundred feet long.

Lane and Shoulder Width

The travel lanes on SR-17 are generally the AASHTO-recommended width of 12 feet. This width accommodates the wide range of vehicle types and sizes that travel this route. Turning lanes range from 10 to 14 feet wide, which also corresponds with the lane widths recommended by AASHTO.

Shoulder widths along SR-17 vary from 2 to 5 feet. This is less than the AASHTO-recommended shoulder width for this type of facility, which is 8 to 12 feet.

Structural Conditions

Pavement Condition

The IRI HCS ratings for SR-17 are fair along the entire length of SR-17 (UDOT 2008a). Table 2-17 shows the 2005 skid number and 2005 rut depth measurements for SR-17 by milepost. These measurements generally indicate good conditions along the highway with the exception of about MP 1, which showed substandard conditions based on skid number.

Table 2-17. Skid Numbers and Rut Depths on SR-17

	Pavement Condition	
Milepost	Skid Number	Rut Depth
1	30	0.14
2	50	0.16
3	46	0.15
4	38	0.17
5	59	0.15
6	52	0.23

Sources: UDOT 2007b, 2007c

Drainage

As with SR-9, drainage along SR-17 is sheet flow off the highway into roadside ditches that is handled through cross culverts spaced periodically along the highway to convey water into the natural drainage paths. For the most part, there are no specific storm drain systems or retention/detention basins. There is a limited storm drainage system with curb and gutter through sections of La Verkin, but this is the only area with this type of infrastructure.

During normal storms, the existing drainage system appears to function at acceptable levels with minimal flooding. However, it is unknown if the system is adequate to accommodate larger storms and floods. Based on the history of the development of the corridor, it is unlikely that the drainage system is adequate to accommodate a 100-year storm.

Bridge and Structure Conditions

There are two bridges on SR-17 in the study limits. As shown in Table 2-18, both bridges are in very good condition.

Table 2-18. Bridges along SR-17

Bridge Identification Number	Milepost	Sufficiency Rating	Water Feature Intersected	Bridge Type
0F 589	0.6	94.5	La Verkin Creek	Prestressed concrete
0F 550	3.4	96.9	Ash Creek	Prestressed concrete

Source: UDOT 2008b

Traffic Conditions

Level of Service

Table 2-19 and Figure 5 above, Annual Average Daily Traffic (AADT) for 2006 and 2035, show the existing (2006) levels of service on SR-17.

Table 2-19. Existing (2006) Levels of Service on SR-17

Begin MP	End MP	2006 AADT	Number of Lanes	2006 LOS
0.0	1.0	5,580	3	A
1.0	4.6	3,090	2	A
4.6	6.0	2,630	2	A

Source: Horrocks Engineers 2007

As shown in Table 2-19 above, current levels of service along SR-17 are free-flowing. As with SR-9, the information about SR-17 in Table 2-19 does not represent the level of service that would be experienced in areas where the highway is multiple lanes, has climbing or passing lanes, or travels through towns with intersections and multiple access points. Detailed analyses would be required to develop levels of service for these other areas. Because the purpose of the EWCTS is to develop a general idea of highway level of service, these additional analyses were not part of the study.

In 2006, truck traffic on SR-17 made up between 17% and 24% of the daily traffic along the 6-mile-long corridor. Truck traffic was lightest (17%) near the intersection of SR-17 and SR-9 and heaviest (24%) near the intersection with I-15. Truck percentages gradually increase from south to north between these two points.

Unlike SR-9, where the majority of UDOT's recorded truck traffic is large RVs and light delivery trucks, much of the truck traffic on SR-17 is heavy, semi-tractor-trailer-type trucks. SR-17 is a major interstate truck route that connects SR-59 (which carries traffic to and from northern Arizona) to I-15 and carries a significant amount of regional truck traffic.

Seasonal variation on SR-17 is similar to that on SR-9 (lower AADT in the winter and higher AADT in the summer) since SR-17 also provides an important connection to the entrance to Zion National Park. The seasonal variation on SR-17 is not as pronounced as that on SR-9 since SR-17 serves more local and commuter traffic that uses the route on a daily basis, regardless of the time of year.

Access Management

The entire length of SR-17 is currently designated Regional Rural for access-management purposes (UDOT 2006a). This category is described above in Table 2-15, Access-Management Standards for State Highways. As with SR-9, the corridor does not completely comply with the current state standards. However, as the corridor is improved and developed, the access management will be improved as well. Additionally, access categories are expected to change as the highway is modified and improved over time, which will also affect compliance with the standards.

Safety

Horrocks Engineers completed a safety audit of SR-17 in February 2008 (Horrocks 2008). In its report, Horrocks noted that narrow shoulders exist all along SR-17 and that rumble strips should be installed along the entire corridor.

Overall, the crash *frequency* on SR-17 is higher than expected, and the crash *severity* is considerably higher than expected compared to similar roads in Utah. The crash history for SR-17 shows 40 crashes for the period 2002 to 2005, which is an average of 10 crashes per year. The average accident rate is 1.50 accidents per million vehicle-miles traveled, which is slightly higher than the expected value of 1.46. The severity index is an average of 2.10, which is higher than the expected index of 1.70. The average crash rate is significantly affected by the 2003 rate, which was 2.86. The years 2002, 2004, and 2005 all have a crash rate of about 1.05.

The most frequent accident type over the 4-year period was single vehicle collisions; 30 (75%) of the crashes involved only a single vehicle. The other crashes varied among six other accident types.

From 2002 to 2005, 17 crashes were run-off-the-road crashes and six involved vehicles hitting animals.

The distribution of accident severity over the 4-year period was as follows:

- Non-injury: 18
- Possible injury: 10
- Injury: 6
- Incapacitating injury: 5
- Fatal: 1

Pedestrian and Bicycle Facilities

SR-17 is not as popular a route for recreational bicycling as SR-9. Like SR-9, it does not have formal bicycle lanes or bikeways. Residents of the towns along this part of SR-17 ride within town and from town to town along the highway. The part of SR-17 that passes through La Verkin has sections of sidewalk available for pedestrian use, but the sidewalk is not continuous. In La Verkin, children often ride their bicycles on the sidewalk.

According to the Utah Bicycle Suitability Map (UDOT 2004a), the shoulder of SR-17 is between 2 and 5 feet. SR-17 does not have any special restrictions for bicycle use in the study area.

Because there are no sidewalks along most of SR-17, pedestrians often walk along the road shoulder or on the road itself, a situation that city representatives believe is too dangerous. This is of particular concern to the City because most pedestrians are school-age children that walk to and from bus stops in La Verkin and Toquerville (HDR 2008).

2.2.3 SR-59 Conditions

Highway Geometrics

Terrain

Other than the final 3 miles down the "Hurricane Hill" into Hurricane, which is a very steep grade (6% to 8% in some places), the terrain of SR-59 is generally level. Though some segments could be considered rolling terrain, they are short enough that they do not significantly affect operation of the highway for any extended period.

Horizontal and Vertical Alignment

As mentioned above in the section titled Terrain, the last 3 miles of SR-59 that travel down the "Hurricane Hill" are on a steep grade. Just south of MP 21, there is a runaway truck ramp due to the severity of the grade. Though this might not be the optimal location for the ramp based on truck operations and speeds, it is the only location along this part of SR-59 with enough available space to accommodate a runaway truck ramp. The ramp appears to function adequately and is used on a regular basis. Combined with the steep grade, there are a few sharper horizontal curves that restrict the speed limit to about 35 mph through this segment as the road traverses the side of the hill. From the Arizona state line (MP 0) to the "Hurricane Hill," the alignment is generally straight with gradual horizontal and vertical curves that follow the natural features of the terrain.

Passing Opportunities

From the Arizona state line (MP 0) through the town of Hildale (about MP 1), there are no passing opportunities due to numerous intersections, access points, and driveways in town. The section of highway between MP 1 and about MP 20 provides more opportunities for passing since there are several longer, straight segments. However, additional designated passing lanes would increase the safety for passing maneuvers. The numerous trucks that use this route often interfere with the ability to pass safely.

Right-of-Way Width

The right-of-way width of SR-59 is generally between 100 and 200 feet. An exception is the last (northernmost) two blocks in downtown Hurricane along 100 South and Main Street where SR-59 ties to SR-9; the right-of-way through this area is 200 feet wide.

Table 2-20 shows the average right-of-way width by segment. The mileposts and right-of-way widths shown in the table are only approximate based on the best available information from UDOT.

Table 2-20. Average Right-of-Way Width by Segment of SR-59

Segment	Average Right-of-Way Width (feet)[a]
MP 0 to MP 15	100
MP 15 to MP 23	200

[a] Widths determined from best available milepost and as-built roadway plans as provided by UDOT.

Lane and Shoulder Width

The travel lanes on SR-59 are generally the AASHTO-recommended width of 12 feet. This width accommodates the wide range of vehicle types and sizes that travel this route. Turning lanes range from 10 to 14 feet wide, which also corresponds with the lane widths recommended by AASHTO.

Shoulder widths along SR-59 vary from 2 to 5 feet. This is less than the AASHTO-recommended shoulder width for this type of facility, which is 8 to 12 feet.

Structural Conditions

Pavement Condition

The IRI HCS ratings for SR-59 are fair and poor along the entire length of the highway (UDOT 2008a). Table 2-21 below shows the 2005 skid number and 2005 rut depth measurements for SR-59 by milepost. These measurements generally indicate good conditions along the highway.

Table 2-21. Skid Numbers and Rut Depths on SR-59

	Pavement Condition	
Milepost	Skid Number	Rut Depth
1	45	0.16
2	49	0.13
3	53	0.12
4	56	0.18
5	56	0.19
6	57	0.18
7	56	0.22
8	54	0.19
9	52	0.25
10	48	0.22
11	57	0.36
12	55	0.08
13	62	0.16
14	59	0.09
15	56	0.06
16	58	0.10
17	54	0.14
18	51	0.08
19	50	0.14
20	48	0.13
21	39	0.08
22	38	0.12

Sources: UDOT 2007b, 2007c

Drainage

Sheet flow drainage from SR-59 is handled through roadside ditches with cross culverts spaced periodically along the highway to convey water into the natural drainage paths through the area. There are no specific storm drain systems or retention/detention basins along SR-59.

Bridge and Structure Conditions

There are two bridges on SR-59 in the study limits. As shown in Table 2-22 below, both bridges are in good condition.

Table 2-22. Bridges along SR-59

Bridge Identification Number	Milepost	Sufficiency Rating	Water Feature Intersected	Bridge Type
0H9862	9.2	80	Gould's Wash	Steel
0E2052	12.7	89.2	Gould's Wash	Concrete continuous

Source: UDOT 2008b

In addition to bridges, there are also a number of culverts along SR-59. As with SR-9, some of the culvert ends are very close to the road edge, which has the effect of narrowing the clear zone through those areas. This condition exists at about MP 1.3, MP 1.9, MP 11.1, MP 14.5, and MP 15.4.

Traffic Conditions

Level of Service

Table 2-23 and Figure 5 above, Annual Average Daily Traffic (AADT) for 2006 and 2035, show the existing (2006) levels of service on SR-59.

Table 2-23. Existing (2006) Levels of Service on SR-59

Begin MP	End MP	2006 AADT	Number of Lanes	2006 LOS
0.0	8.1	4,025	2	C
8.1	19.5	3,215	2	C
19.5	22.5	5,175	2	C

Source: Horrocks Engineers 2007

As shown in Table 2-23 above, current levels of service on SR-59 are generally stable flow. The segments listed are in areas where the highway is two lanes (one lane in each direction). The capacity thresholds for SR-59 are lower than those for SR-9 and SR-17 because the highway is used more for longer, higher-speed travel. On this type of highway, driver tolerance for slower speeds is lower and passing opportunities are fewer than for shorter, slower-speed highways (such as SR-9 and SR-17). Because of this difference, the level of service on SR-59 is lower even though the traffic volumes are similar to those on SR-9 and SR-17.

In 2006, truck traffic on SR-59 was about 17% of the total daily traffic near the Utah-Arizona border and 31% of the total daily traffic near the intersection with SR-9. The percentage of truck traffic on the highway near and through Apple Valley is about 24% of the total traffic stream.

SR-59 is an important regional and interstate truck route that connects northern and central Arizona to I-15. For this reason, many heavy interstate-type semi-tractor trailers use this route for long-haul trucking. This is reflected in the higher truck percentages recorded on SR-59. Also, many RVs use this route to access Zion National Park and the Glen Canyon National Recreation Area.

Seasonal variation on SR-59 is probably similar to that on SR-9 and SR-17 (lower AADT in the winter and higher AADT in the summer) since SR-59 is used by many travelers to access national parks and other recreation areas in northern Arizona.

Access Management

Table 2-24 summarizes the current access categories for SR-59 in the study area. Categories are described above in Table 2-15, Access-Management Standards for State Highways. As with the other corridors, SR-59 does not completely meet the current standards. However, as the corridor is improved and developed, the access management will be improved as well. Additionally, access categories are expected to change as the highway is modified and improved over time, which will also affect compliance with the standards.

Table 2-24. Access-Management Categories for SR-59 in the Study Area

Begin MP	End MP	Category
0.0	0.7	Regional Rural
0.7	19.5	System Priority Rural
19.5	20.7	Regional Rural
20.7	22.2	Community Rural

Source: Horrocks Engineers 2007

Safety

Horrocks Engineers completed a safety audit of SR-59 in February 2008 (Horrocks Engineers 2008). The following recommendations are based on general observations of the highway.

- The crash *frequency* and *severity* are higher than expected compared to similar roads in Utah.
- There are no rumble strips along the highway. The roadway has long, straight sections. Shoulders need to be widened along the entire segment and rumble strips added.
- Much of the existing guardrail between about MP 20 and MP 22 is in good condition. There are no signs of hits, but support behind posts is lacking and needs to be added (that is, additional fill material needs to be added to provide enough material to properly embed the posts and for lateral support).
- A dynamic speed feedback sign is needed for northbound traffic on the final descent (through the cliff) before the highway enters Hurricane.
- Many of the signs along the route are in poor condition with low reflectivity. Many signs have been shot up or are otherwise damaged. Signs need to be inventoried and replaced as appropriate.

The crash history for SR-59 shows 133 crashes for the period 2002 to 2005, which is an average of 33.3 crashes per year. The average accident rate is 1.76, which is higher than the expected value of 1.70. The severity index is an average of 1.52, which is more than the expected index of 1.46.

The most frequent accident type over the 4-year period was single-vehicle collisions; 82 (62%) of the crashes involved only a single vehicle. The other crashes varied among 16 other accident types.

From 2002 to 2005, 69 crashes were run-off-the-road crashes and six involved vehicles hitting animals.

The distribution of accident severity over the 4-year period was as follows:

- Non-injury: 84
- Possible injury: 19
- Injury: 14
- Incapacitating injury: 13
- Fatal: 3

Bicycle and Pedestrian Facilities

Several popular mountain-biking areas on BLM-administered land are accessed primarily by SR-59. Because most of these areas are far from the highway, there is not much related recreational bicycling along the highway. An exception is the area near the top of the Hurricane Cliffs, where mountain bikers sometimes use a short section of the highway to complete a mostly off-road loop. As with SR-9 and SR-17, SR-59 does not have formal bicycle lanes or bikeways. Some recreational road cyclists, such as those on long road tours, use SR-59 between the Utah-Arizona border and Hurricane. In Hildale, children often ride their bicycles along the side of the road.

There are no sidewalks along most of SR-59, the exception being short segments in Hurricane near the Hurricane City Center. The few pedestrians in and around the towns of Hildale and Apple Valley walk along short stretches of the road shoulder in areas near existing development because there is no other place for them to walk parallel to the highway.

2.3 Transportation Plans That Apply to the Study Area

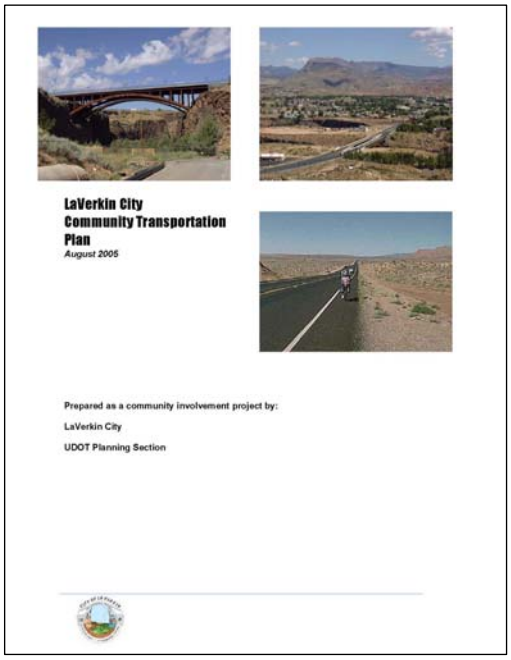
There are few formal or adopted transportation plans that apply to the corridor study areas. Because the study area is outside the St. George metropolitan area, the Dixie Metropolitan Planning Organization's regional transportation plan does not address the study area. However, UDOT formerly worked with the cities of Hurricane, La Verkin, and Springdale to develop community transportation plans and with Springdale to develop a trail feasibility study. Apple Valley has developed a conceptual road plan. Finally, UDOT has also addressed some long-range planning goals for the highways through the Statewide Transportation Improvement Program (STIP) and its Long-Range Transportation Plan.

2.3.1 Hurricane City Transportation Master Plan

In 2004, UDOT and the City of Hurricane jointly prepared a Transportation Master Plan for the city (UDOT 2004b). A report that was released in October 2004 lists the priority improvements identified at that time. Hurricane has grown and changed substantially since that plan was prepared, but priority improvements that have not yet been constructed are probably still important to the city. The priority improvements listed in the transportation master plan and that occur in the EWCTS area are:

- 600 North: make improvements and construct new roadway from SR-9 to 2200 West
- Intersection of SR-59 and SR-9: realign SR-59 to intersect SR-9 at 600 North
- SR-9: widen SR-9 from 300 West to 600 North

2.3.2 La Verkin City Community Transportation Plan and General Plan



La Verkin City has a Community Transportation Plan that was completed in 2005 and includes transportation policies in its 2005 General Plan.

UDOT and the City of La Verkin jointly prepared La Verkin's Community Transportation Plan (UDOT 2005). A meeting with La Verkin staff in 2008 confirmed that some of the priority projects listed in the study have already been constructed, but others have not. The City has stated that the following priority projects listed in the 2005 plan are still needed:

- Add landscaping along SR-9
- Finish sidewalk improvements (much of the sidewalk improvements have been completed, but the area on SR-17 north of about 630 North is still in need of safe pedestrian facilities)
- Conduct speed review on SR-9 through the city
- Open the tunnel to Sand Traps as recreational trail
- Study and provide an alternate route for vehicle traffic, possibly Hot Springs Bridge (also known as the Pah Tempe Bridge)

The City has also recently identified some additional priority projects along the SR-9 and SR-17 corridors (HDR 2008). These projects are:

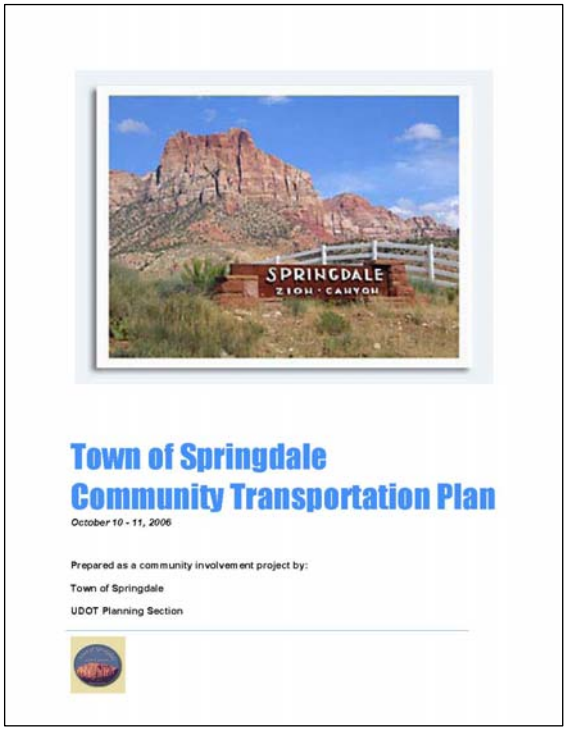
- Additional pedestrian walkway on the west side of the Virgin River Bridge
- Left-turn lane for westbound traffic just east of the SR-9/SR-17 intersection
- Power backup for the stoplight at the intersection of SR-9 and SR-17

The La Verkin City General Plan (Utah Community Planners 2005) includes the following transportation policies that are directly related to management of UDOT facilities in the city:

- Cooperate with UDOT to provide appropriate traffic-control devices or signs where needed.
- Participate in intergovernmental coordination and cooperation among all agencies and levels of government for planning, management, financing, and implementation of transportation system improvements.
- Protect SR-9 and SR-17 by encouraging site designs that minimize the number and frequency of curb and median cuts necessary to serve proposed developments along the highways.

2.3.3 Springdale Town Community Transportation Plan, General Plan, and Trail Feasibility Study

The Town of Springdale has a Community Transportation Plan and includes transportation policies in its General Plan. The Town also recently worked with UDOT to complete a feasibility study for a Zion Canyon Trail that would parallel SR-9.



UDOT and the Town of Springdale completed the Community Transportation Plan in October 2006 (UDOT 2006b). The priority projects listed in that plan are:

- Bridge and road realignment of the Paradise Road/SR-9 intersection
- Sidewalk projects
- Shielded lighting along SR-9
- Speed study to lower the speed limit
- New parking areas for Zion National Park visitors
- Zion Canyon bicycle/pedestrian trail

The Springdale Town General Plan (Town of Springdale 2005) includes objectives and implementation strategies that identify UDOT as a participant. The Town's objectives for SR-9 are as follows:

- Encourage a safe and well-maintained SR-9 corridor as well as other public streets throughout Springdale.
- Preserve the SR-9 corridor by ensuring that new development does not require widening of SR-9, except for a bicycle lane.
- Preserve slow speeds for traffic through Springdale.
- Maintain visibility at intersections, side streets, and driveways for safety.
- Reduce parking congestion through the use of creative approaches to meet the anticipated parking demand.
- Ensure that motorized traffic flows as smoothly as possible, despite anticipated large increases in traffic volume.

Recent discussions with Springdale Town staff have revealed that the Town is also interested in developing a corridor management agreement with UDOT to address long-term planning for design of development and access along SR-9. This corridor management agreement could address the recommended alignment for the proposed Zion Canyon Trail as described in the *Zion Canyon Trail Feasibility Study* (UDOT, no date).

2.3.4 Toquerville City Transportation Master Plan

A Transportation Master Plan was completed for the City of Toquerville in January 2008 (Riley Transportation Consultants and Sunrise Engineering 2008). The plan, which focuses on coordination with surrounding communities and the county, design issues and constraints, and right-of-way issues, provided direction for identifying the City's top transportation project priorities. In addition to reviewing existing data and projecting future conditions, the City worked with its residents to identify projects and develop the final plan. The plan development process included a detailed evaluation of SR-17 since it is the primary transportation facility through Toquerville.

Of highest priority to Toquerville is a bypass for SR-17. The plan identifies four different alignment options with alternatives for each alignment. The plan does not identify a preferred bypass alignment but does include action items to begin a more detailed SR-17 bypass study in coordination with UDOT and to work with the Dixie Metropolitan Planning Organization to identify funding for implementing the plan.

2.3.5 Apple Valley Road Plan

The Town of Apple Valley created a Road Plan in 2008 (Alpha Engineering Company 2008). That plan shows a major arterial intersecting SR-59 at about MP 8, which is the town's Main Street (also known as the Smithsonian Butte National Backcountry Byway). The Town identifies a major arterial as having a 100-foot-wide right-of-way. The Road Plan also shows 66-foot-wide major collectors intersecting SR-59 at about MP 2, MP 5, MP 6, MP 8 (critical intersection with the highway and the major arterial), and MP 12.5.

2.3.6 UDOT Plans: Statewide Transportation Improvement Program (STIP) and Long-Range Transportation Plan (LRTP)

The Statewide Transportation Improvement Program (UDOT 2008c) lists one major project along SR-9 that UDOT expects to finish constructing in 2008. This project involves the widening of SR-9 to four lanes between 300 West and 800 North in Hurricane. The Statewide Transportation Improvement Program does not list any other projects along the study corridors.

The Long-Range Transportation Plan (UDOT 2007d) identifies two major capacity improvement priorities for the study corridors. The first, to be constructed between 2026 and 2030, is widening SR-59 for about 1.6 miles between its intersection with SR-9 in Hurricane south through the cliff to about MP 20.5 (Big Plain Junction) on SR-59. The second project, which is identified only as "unfunded" and is not scheduled for a specific timeframe, is widening the entire length of SR-17 from La Verkin to its intersection with I-15.

2.3.7 Rural Planning Organization

In the summer of 2008, the cities of Hurricane, La Verkin, Leeds, and Toquerville officially became part of a new Rural Planning Organization (RPO). An RPO is an organization of elected officials from rural communities that provides a forum for local input on transportation issues that affect non-metropolitan areas with a population below 50,000. The RPO will serve as a link between UDOT, local elected officials, and citizens during the transportation planning and decision-making processes. The new RPO is managed by the Five County Association of Governments and is in the initial stages of developing a transportation plan. UDOT will be an important partner in the RPO's initial and subsequent transportation planning efforts.

3.0 Future Conditions in the Study Area

This section presents the expected future traffic conditions on SR-9, SR-17, and SR-59. Horrocks Engineers projected future conditions using the Dixie Metropolitan Planning Organization traffic model for sections of SR-9 and SR-17 that are in Hurricane and La Verkin. For rural sections of all three highways, Horrocks used historical UDOT traffic counts and expected population and household growth to develop the 2035 estimates.

This section discusses expected future conditions and does not present solutions to potential challenges associated with those conditions. Solutions to issues or problem areas identified in this section are addressed in Section 5.0, Project Identification and Recommendations, which begins on page 75 of this report.

3.1 SR-9

According to Horrocks' projections, traffic on SR-9 is expected to nearly double by the planning year 2035. This increase will mostly be due to the growth of towns and cities along the highway. Other traffic generators, such as Zion National Park, are not expected to significantly affect future traffic volumes on SR-9 because growth in park visits and visitor-related traffic is not expected to significantly increase in the future.

Table 3-1 and Figure 5 above, Annual Average Daily Traffic (AADT) for 2006 and 2035, show the future projected (2035) traffic volumes and levels of service for SR-9. These levels were calculated using the Highway Capacity Manual 2000 methodologies for the same segments that were analyzed under the existing conditions discussion in Section 2.2.1, SR-9 Conditions.

Table 3-1. Future (2035) Levels of Service on SR-9

Begin MP	End MP	2035 AADT	Number of Lanes	2035 LOS
12.5	17.8	6,000	3	B
17.8	26.8	6,000	2	B
26.8	29.8	5,382	2	A
29.8	32.7	5,427	2	A

Source: Horrocks Engineers 2007

As shown in Table 3-1 above, future levels of service along SR-9 are projected to be free-flowing or reasonably free-flowing. As with the existing conditions analysis, this information represents segments of open highway that do not have multiple lanes, climbing or passing lanes, or towns with intersections and

multiple access points. The results in Table 3-1 show that, generally, SR-9 can remain a two-lane highway and maintain acceptable levels of service into the future. The table does not address improvements in towns and cities, such as turn lanes or center median two-way left-turn lanes, or other open highway improvements, such as passing and truck climbing lanes, that would help maintain acceptable levels of service. Some of these improvements are included in the recommended project list presented in Section 5.0, Project Identification and Recommendations.

The number of large (heavy) vehicles and trucks on SR-9 is not expected to change between now and 2035. Because the highway will remain a primary entrance to Zion National Park, heavy vehicle traffic will continue to be dominated by RVs, buses, and local delivery trucks with only a few semi-tractor trailers. The growth in the number of trucks will be greatly outpaced by the increase in the number of passenger vehicles, so the percentage of traditional truck traffic on SR-9 will decrease in the future.

As noted in Section 2.2.1, SR-9 Conditions, the seasonal variation on SR-9 is heavily influenced by tourist and recreation-related traffic. As the towns along the highway continue to grow, the seasonal variation in traffic on SR-9 will become slightly less variable because more of the annual traffic will be trips by residents and regular highway users instead of visitors.

3.2 SR-17

By 2035, traffic on SR-17 is expected to increase by 250% to 400% depending on the location along the highway. This increase will mostly be due to the growth of La Verkin and Toquerville, but traffic volumes will be influenced by growth along the nearby SR-9 and SR-59 highways since residents of those areas will use SR-17 to access I-15.

Table 3-2 below and Figure 5 above, Annual Average Daily Traffic (AADT) for 2006 and 2035, show the future projected (2035) traffic volumes and levels of service for SR-17. These levels were calculated using the Highway Capacity Manual 2000 methodologies for the same segments that were analyzed under the existing conditions discussion in Section 2.2.2, SR-17 Conditions.

Table 3-2. Future (2035) Levels of Service on SR-17

Begin MP	End MP	2035 AADT	Number of Lanes	2035 LOS
0.0	1.0	12,000	3	C
1.0	4.6	16,000	2	D
4.6	6.0	16,000	2	D

Source: Horrocks Engineers 2007

As shown in Table 3-2 above, future levels of service along SR-17 are projected to significantly decrease (worsen) without improvements. The results show that, generally, SR-17 needs to be widened and improved to a four-lane road (two lanes in each direction) to maintain LOS C or better. If the Toquerville bypass is constructed and it becomes the new route for SR-17, then the existing roadway would not need to be widened and would remain a two-lane, local road with an acceptable level of service. The expected need to widen SR-17 through the center of Toquerville is the main reason that town representatives and residents favor the bypass route; by building the bypass, town planners could preserve a lower-speed route through the heart of town.

The number of large (heavy) vehicles and trucks on SR-17 is expected to increase in the future, mostly as a result of the projected increase in truck traffic on SR-59 and the fact that SR-17 is a major route for regional truck traffic. The growth in the number of trucks will be greatly outpaced by the increase in the number of passenger vehicles (such that truck percentages on SR-17 will decrease in the future), but truck percentages on SR-17 are still expected to remain much higher than on other similar highways.

As discussed in Section 2.2.2, SR-17 Conditions, there is some seasonal variation in traffic on SR-17. However, as La Verkin and Toquerville continue to grow, the seasonal variation in traffic on SR-17 will become slightly less variable because more of the annual traffic will be trips by residents and regular highway users instead of visitors.

3.3 SR-59

According to Horrocks' projections, 2035 traffic volumes on SR-59 are expected to increase by 200% to 300% depending on the location along the highway. This increase will mostly be due to the growth of individual towns along the highway (Hildale, Apple Valley, and Hurricane). Increases in traffic volumes on SR-59 will also be influenced by regional traffic increases.

Table 3-3 and Figure 5 above, Annual Average Daily Traffic (AADT) for 2006 and 2035, show the future projected (2035) traffic volumes and levels of service for SR-59. These levels were calculated using the Highway Capacity Manual 2000 methodologies for the same segments that were analyzed under the existing conditions discussion in Section 2.2.3, SR-59 Conditions.

Table 3-3. Future (2035) Levels of Service on SR-59

Begin MP	End MP	2035 AADT	Number of Lanes	2035 LOS
0.0	8.1	8,921	2	D
8.1	19.5	6,254	2	C
19.5	22.5	14,000	2	E

Source: Horrocks Engineers 2007

As shown in Table 3-3 above, future levels of service along SR-59 are projected to decrease (worsen) without improvements. As with the existing conditions analysis, this information represents segments of open highway that do not have multiple lanes, climbing or passing lanes, or towns with intersections and multiple access points. The information in Table 3-3 shows that, generally, SR-59 could remain a two-lane highway in 2035 with the exception of the last short segment into Hurricane. The dramatic increase in traffic volumes and worsening of level of service in this segment are primarily due to expected development along the "Hurricane Bench" area east and southeast of Hurricane. Widening this section of SR-59 from two to four lanes would be challenging and costly due to constraints related to terrain. One potential way to address the issue is by constructing an alternate or replacement route that connects the Hurricane Bench to the city of Hurricane. Resolving this issue is very important to local residents.

In addition to the needed widening or alternate route connection near Hurricane, there are other areas through Apple Valley and Hildale where improvements such as turn lanes or center median two-way left-turn lanes will be needed to maintain acceptable levels of service. SR-59 would also benefit from the addition of dedicated passing lanes in some segments to increase safety and roadway

efficiency. Some of these improvements are included in the recommended project list presented in Section 5.0, Project Identification and Recommendations.

The number of large (heavy) vehicles and trucks on SR-59 is expected to increase between now and 2035. This growth would occur because the highway is a major regional truck route. However, as with the other highways, the growth in the number of trucks will be outpaced by the expected increase in the number of passenger vehicles, so the truck percentages on SR-59 will decrease in the future. However, truck percentages on SR-59 are expected to remain high given the highway's regional importance.

As noted in Section 2.2.3, SR-59 Conditions, there is some seasonal variation in SR-59 traffic volumes. The seasonal variation in traffic on SR-59 is expected to remain similar to current levels because this highway is a regional road and because growth in the towns along the highway is not expected to be as concentrated as that along SR-9 or SR-17. Local growth in the area is expected to influence seasonal fluctuations because more of the annual traffic will be residents and regular highway users instead of regional traffic.

4.0 Public Involvement

4.1 General Public Involvement Strategy

Public involvement for the EWCTS focused on meaningful opportunities for public and agency participation. The public involvement activities were designed to ensure that the process identified the most important needs and to involve the public and key stakeholders in a manner that helped identify potential transportation solutions.

In general, public involvement activities included opportunities to review materials, one-on-one interviews, and electronic participation opportunities through the study website. Public participation opportunities were augmented by tools that included corridor-wide mailings to up to 1,500 corridor residents, a series of media releases to inform and invite participation at study events, and information distribution on the UDOT website and websites of cities in the study area. Table 4-1 lists the public involvement support tools.

Table 4-1. Public Involvement Support Tools

Tool	Purpose
Media coverage	As needed to support public involvement plan
Comment forms	To provide opportunities for public and agency involvement; web-based and as part of public involvement events
Informational Handouts	To provide project information and study updates at public events and for distribution by project team
Study brochure	To summarize results of study
Posters	To display information about the study and preliminary findings at public events
Bulk mailings (electronic and hard copy)	To advertise events and to provide updates
Website	To provide project information, reports, schedules, and contact information

Public involvement activities began at project kick-off and continued through the summer of 2008. Table 4-2 shows the timeline of public involvement activities.

Table 4-2. Public Involvement Timeline

Activity	Date(s) Completed
Website launch	December 2007
Initial mailing	December 2007
Transportation Expo Booth (St. George)	February 2008
Agency and stakeholder interviews	January 2008 through May 2008
Update mailings (electronic and hard copy)	May and June 2008
Website and media advertisements	May and June 2008
Public open house (Hurricane)	May 2008
Website updates	Ongoing
Final study summary brochure (mailing)	September 2008

4.2 Public Involvement Goals and Objectives

As it developed the public involvement plan for the EWCTS, UDOT developed goals and objectives to guide the public involvement process.

4.2.1 Public Involvement Goals

UDOT understands the importance of developing public involvement plans that provide meaningful opportunities for participation. Specific goals for the EWCTS included the following:

- To create a high degree of public awareness of the study's purpose, the study process, and opportunities for public involvement
- To develop public trust in the process, the consultant team, and UDOT
- To accommodate area residents' needs and expectations for participation
- To identify and address the most important public and user concerns
- To foster understanding of and support for the final study recommendations among residents, local governments, and key stakeholders
- To effectively involve agencies in the formation of the EWCTS 2035 corridor plan

4.2.2 Public Involvement Objectives

To meet the public involvement goals, UDOT and the study team focused on the following objectives:

- To produce and distribute clear study information that meets public needs
- To keep the study website up to date
- To update interested residents and stakeholders by mailings as needed
- To clearly communicate study information to the local media through the UDOT point of contact as needed
- To share results of public involvement activities with other UDOT offices to ensure that the study meets expectations and stays on track

4.3 Stakeholder and Agency Interaction

UDOT sought stakeholder and agency input in two ways: through one-on-one interviews and through public involvement events. UDOT worked with representatives of city and county governments, state and federal agencies, and interest group representatives (such as those associated with local planning initiatives and advocacy groups).

Because the highways are different geographically and serve different communities, UDOT chose to hold one-on-one interviews with stakeholders and agency representatives. By holding interviews, UDOT was able to discuss issues with the stakeholders and agency representatives in depth. UDOT also attended and participated in the meetings of established groups, such as the Zion Canyon Corridor Committee and the Southern Utah Trucking Association, so that the agency could understand the overall concerns of the stakeholders and how the individual concerns—such as bicycle and pedestrian access and roadway safety—were related.

The study team conducted interviews between January and May 2008. UDOT contacted stakeholders by telephone or in person. At the interviews, UDOT introduced the study and gathered input regarding perceived needs along the study corridors. Several stakeholders also provided input at the 2008 St. George Transportation Expo. As the study progressed, the study team contacted stakeholders as necessary for follow-up questions.

A summary of one-on-one stakeholder and agency interviews is included in Appendix A, Summary of Stakeholder and Agency Interviews. Other stakeholder comments received by mail or e-mail are included in the summary of public comments in Appendix B, Summary of Public Comments.

4.4 Public Outreach

UDOT provided two formal opportunities for the public to review study information and provide comments. These were a booth with informational materials at the St. George Transportation Expo and a public open house at Hurricane Middle School. The public was informed about the opportunities to learn about the study through an initial introductory bulk mailing, media releases before the events, advertisements in local newspapers and on city websites, and a bulk mailing to everyone on the project mailing list inviting them to the events. The public was also invited to participate in the process through the study website, where they could read current study information and provide comments.

The following sections summarize the two public outreach events.

4.4.1 St. George Transportation Expo – February 4, 2008

The first event was held at the Dixie Center in St. George in conjunction with the St. George Transportation Expo. The event provided the public with updates on transportation studies, planning, and projects throughout the region with a special booth dedicated to the EWCTS. Information at the booth included maps and displays summarizing the study area, and project representatives were available to answer questions, listen to concerns, and gather ideas for safety and traffic improvements along the study corridors. About 75 people visited the EWCTS booth during the Expo.

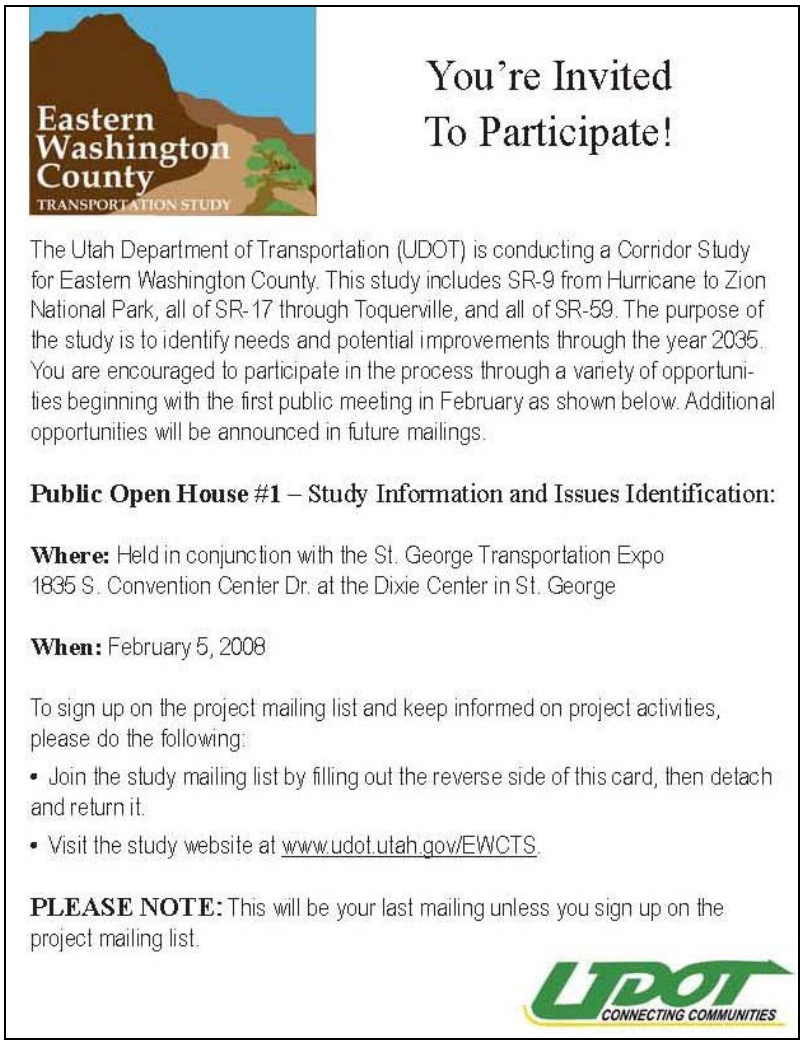
4.4.2 Public Open House – May 28, 2008

In May 2008, UDOT sponsored a public open house at Hurricane Middle School. The purpose of this meeting was to give residents a chance to learn more about the corridor study, review information that had been gathered to date, and provide comments on safety and congestion problems. About 55 people attended the meeting. A summary of comments is included in Appendix B, Summary of Public Comments.

4.5 Public Involvement Tools/Mailings and Media

As listed above in Table 4-1, Public Involvement Support Tools, UDOT used several methods to distribute information about the study. Examples of some of the materials used are included below.

4.5.1 Initial Postcard



Eastern Washington County
TRANSPORTATION STUDY

You're Invited To Participate!

The Utah Department of Transportation (UDOT) is conducting a Corridor Study for Eastern Washington County. This study includes SR-9 from Hurricane to Zion National Park, all of SR-17 through Toquerville, and all of SR-59. The purpose of the study is to identify needs and potential improvements through the year 2035. You are encouraged to participate in the process through a variety of opportunities beginning with the first public meeting in February as shown below. Additional opportunities will be announced in future mailings.

Public Open House #1 – Study Information and Issues Identification:

Where: Held in conjunction with the St. George Transportation Expo
1835 S. Convention Center Dr. at the Dixie Center in St. George

When: February 5, 2008

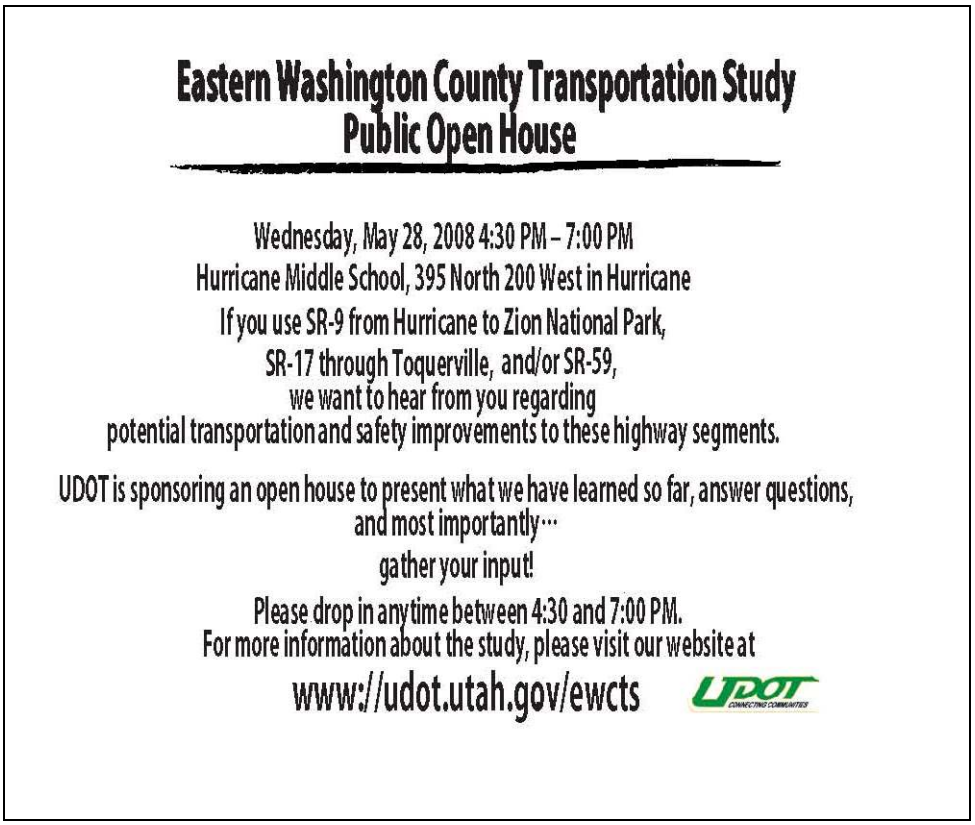
To sign up on the project mailing list and keep informed on project activities, please do the following:

- Join the study mailing list by filling out the reverse side of this card, then detach and return it.
- Visit the study website at www.udot.utah.gov/EWCTS.

PLEASE NOTE: This will be your last mailing unless you sign up on the project mailing list.

UDOT CONNECTING COMMUNITIES

4.5.2 May 28, 2008, Print Advertisement



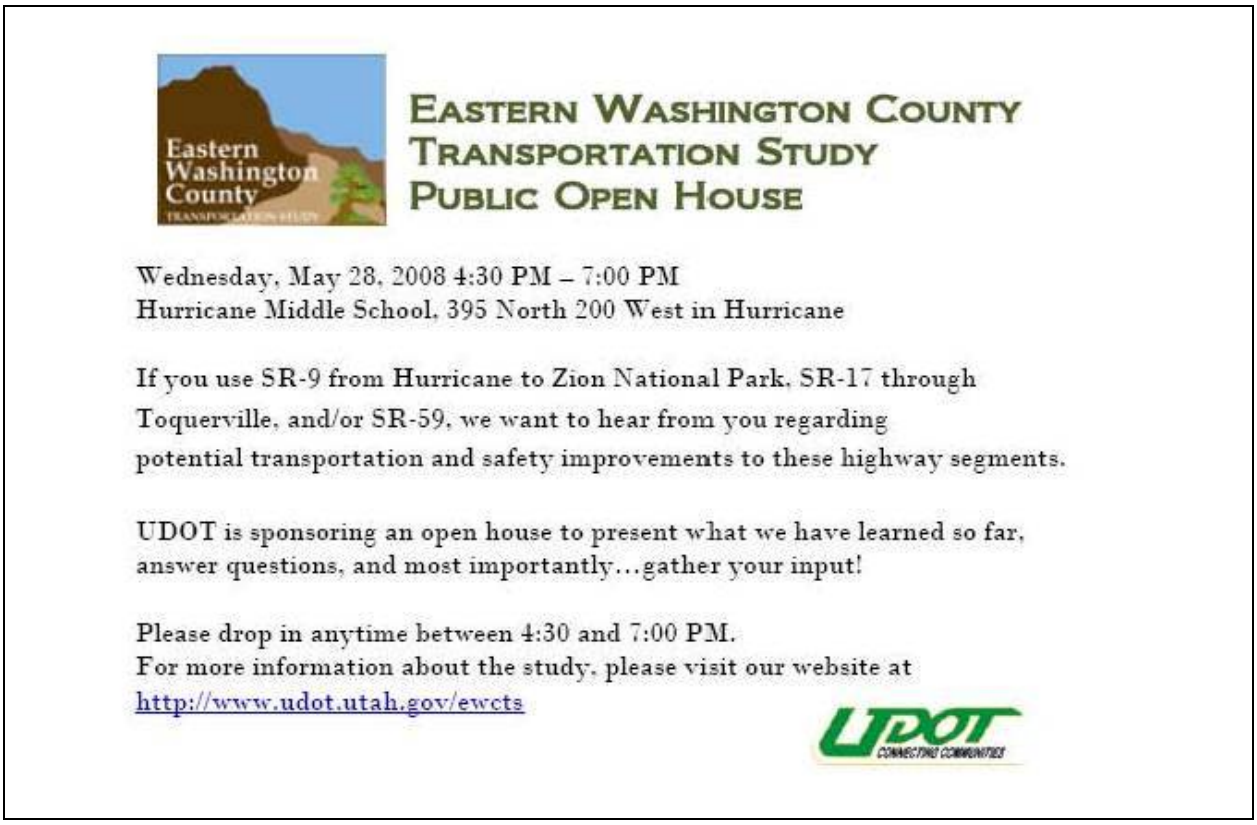
Eastern Washington County Transportation Study
Public Open House

Wednesday, May 28, 2008 4:30 PM – 7:00 PM
Hurricane Middle School, 395 North 200 West in Hurricane
If you use SR-9 from Hurricane to Zion National Park,
SR-17 through Toquerville, and/or SR-59,
we want to hear from you regarding
potential transportation and safety improvements to these highway segments.

UDOT is sponsoring an open house to present what we have learned so far, answer questions, and most importantly···
gather your input!

Please drop in anytime between 4:30 and 7:00 PM.
For more information about the study, please visit our website at
www://udot.utah.gov/ewcts

4.5.3 Informational Postcard



EASTERN WASHINGTON COUNTY
TRANSPORTATION STUDY
PUBLIC OPEN HOUSE

Wednesday, May 28, 2008 4:30 PM – 7:00 PM
Hurricane Middle School, 395 North 200 West in Hurricane

If you use SR-9 from Hurricane to Zion National Park, SR-17 through Toquerville, and/or SR-59, we want to hear from you regarding potential transportation and safety improvements to these highway segments.

UDOT is sponsoring an open house to present what we have learned so far, answer questions, and most importantly…gather your input!

Please drop in anytime between 4:30 and 7:00 PM.
For more information about the study, please visit our website at
http://www.udot.utah.gov/ewcts

5.0 Project Identification and Recommendations

The EWCTS team used the results of interviews, surveys, and research to develop a list of recommended improvement projects and a list of coordination and program recommendations. (See Section 2.2, Roadway Characteristics, Section 3.0, Future Conditions in the Study Area, and the appendices that follow Section 7.0 for more detailed information about existing or expected issues along the study corridors.) This section focuses on the process used to develop the lists and how the recommended project list was prioritized. Because access management is always a primary concern of local governments and of UDOT along rural corridors, this section also includes a section on access management along the study corridors.

5.1 Project Identification Methodology

The EWCTS identified projects using a variety of methods. The planning process included interviews, public meetings, Internet-based comment opportunities, and analysis of existing and expected roadway conditions.

Communication with agency representatives, local governments, UDOT employees, and business interests helped identify projects that would directly address existing and future corridor issues. Section 4.0, Public Involvement, describes these stakeholders' involvement in the study process.

The general public provided input on the corridors at two public outreach events as described in Section 4.0: the St. George Transportation Expo and a EWCTS open house. The public reiterated much of what the study team heard from local governments regarding needs on a more regional level, but also provided valuable information about specific issues at local intersections or pointed out local roadway geometry issues that needed to be addressed in the planning process.

Finally, to help define projects that would improve the long-term uses and development of the corridor, the team conducted technical analyses of accident data, existing and future levels of service, traffic forecasts, and population and employment forecasts. The team reviewed the physical condition of the corridor by looking at information on roadway geometry, pavement condition, average right-of-way width, shoulder width, and structures.

5.2 Project Lists

The information gained through stakeholder involvement, public input, and the results of technical analyses was used to create an initial list of projects. This list was then filtered by the project team to ensure that the recommendations were consistent with UDOT's vision and goals for the corridors (see Section 1.0, Introduction). As the list evolved, some separately identified projects were combined where it made sense to do so (for example, similar types of projects along the length of a particular highway, such as turn lanes along SR-9).

Once the large "master list" was complete, it was then split into two lists by type of project: (1) more traditional improvement projects and (2) other coordination efforts or programs that are not specific or need further consideration by UDOT, coordinating parties (such as local governments), or both. The coordination efforts and programs are not ranked because, in most cases, implementation will depend on initiation by or the participation of other parties, or, in some cases, coordination will be ongoing through the life of the plan.

For the most part, the improvement project list does not include the construction, study, or coordination regarding bypass or new connection routes. UDOT recognizes that there are ongoing discussions at the local level regarding a potential bypass of SR-17 (a Toquerville bypass) and new connections between SR-9 and SR-59 east of La Verkin, SR-17 and I-15 near Leeds, SR-17 and SR-9 east of La Verkin, and SR-59 and the Southern Corridor south of Hurricane. The improvement project list focuses on mainline improvements, with the exception of the immediate need for improvements to the intersection of SR-59 and SR-9 (Project 59-A), which could be accomplished using a new connection or bypass. The coordination list includes items to address other than the other potential bypass and alternate routes. In all cases, early coordination with UDOT is critical if the parties want to someday designate the bypasses or new routes as state routes (an example being the potential redesignation of the Toquerville bypass as the "new" SR-17 and transferring management of the existing SR-17 to the city in "trade").

Table 5-1 below lists the recommended improvement projects by rank for each highway and supporting information about or findings that support each project's inclusion in the list. Figure 6 through Figure 11 below show the geographic location of each project. Table 5-2 below lists the coordination agreements and programs that will support future management of the corridor. The lists are intended only to provide UDOT with information and are in no way intended to require construction of specific projects or completion of studies in a specific order. While Table 5-1 simply lists the projects by rank, the Implementation Program presented in Section 6.1, Implementation, provides recommendations for the order in which projects could be constructed given project relationships (such as projects in the same location or projects that could not be constructed without other prior or simultaneous improvements).

Table 5-1. EWCTS Recommended Improvement Projects

Project ID	Project Description	Average Score (weighted max total = 15)	Rank by Highway	Overall Rank	Project Need/Information
State Route 9, Hurricane to Zion National Park Boundary					
9-A	Add pedestrian walkway to the west side of the Virgin River Bridge, MP 11, westbound.	4.5	10	19	From local government. Students walking to the school that is on the west side of the road but south of the bridge currently have to cross the highway to the east side, cross the river on the existing east-side pedestrian walkway, and cross back over to the west side to get across river. This inconvenience leads to unsafe crossing by students and others. Also, the existing sidewalk on the west side ends at the bridge ("sidewalk to nowhere").
9-B	Add rumble strips (both directions) between the following points: • MP 12.5 to MP 16.8 • MP 18.4 to MP 19.1 • MP 19.6 to MP 27.7	5.15	9 (tie)	18 (tie)	From safety studies. Shoulder and center rumble strips recommended for all corridors by Utah Highway Patrol (UHP).
9-C	Install a two-way left-turn lane between the following points: • MP 12.4 to MP 13.0 • MP 17.3 to MP 18.0 • MP 27.47 (through Rockville) • MP 30.0 to MP 33.0 (through Springdale)	8.3	2	5 (tie)	From safety studies. Note that Rockville City has stated that it does not want the two-way left-turn lane through town.
9-D	Add a second traffic lane to improve intersection of SR-9 and SR-17, MP 13.0 to MP 12.5.	7.075	3 (tie)	7 (tie)	From local government, safety study, and public comment. Per UDOT, this project is already being considered.
9-E	Improve curve delineation at the following locations: • MP 13.2, eastbound • MP 13.9, eastbound • MP 14.8, eastbound • MP 15.0, westbound • MP 19.0, eastbound (note: error in MP system) • MP 20.1, eastbound (also add curve and arrow signs)	5.2	7 (tie)	16 (tie)	From safety studies.

Table 5-1. EWCTS Recommended Improvement Projects

Project ID	Project Description	Average Score (weighted max total = 15)	Rank by Highway	Overall Rank	Project Need/Information
9-F	Remove vertical curve to improve sight distance, MP 13.5.	5.2	7 (tie)	16 (tie)	From safety studies.
9-G	Widen shoulder and flatten side slope or add barrier/guardrail, MP 13.6 to MP 13.7, eastbound.	5.175	8	17 (tie)	From safety studies.
9-H	Widen shoulders to standard between the following points: • MP 12.7 to MP 13.1, eastbound • MP 14.4 to MP 13.9, westbound • MP 16.9 to MP 16.5, westbound • MP 29.2 to MP 28.7, westbound	6.325	5	12	From public and local agency comments. There is heavy use by cyclists and pedestrians between Rockville and Springdale, where the existing shoulder is very narrow and/or obstructed with debris from rockfall, etc. (about MP 28 to about MP 29.5). Would need to confirm that what is constructed is consistent with or does not hinder application of the recommendations in the Zion Canyon Trail Feasibility Study (UDOT, no date). A related request was to stripe bicycle lanes between Rockville and the Zion National Park entrance in Springdale. The right-of-way between Rockville and Springdale (about MP 28 to about MP 29.5) won't accommodate an on-highway bicycle lane; will need to coordinate with both towns if an off-highway bicycle trail is to be constructed (Springdale is planning a Class I trail; might be able to connect into this).
9-I	Add turn lanes as follows: • Left-turn pocket onto La Verkin overlook, MP 14.9, westbound • Left-turn storage to the south for "T" intersection, MP 16.1, westbound • Left-turn storage, MP 21, westbound • Left-turn storage, MP 25.8, westbound	7.075	3 (tie)	7 (tie)	From safety studies.
9-J	Extend culverts as follows: • Extend culvert and remove guardrail, MP 16.4, both directions • Extend culvert, MP 30.4, both directions	5.8	6 (tie)	15 (tie)	From safety studies.

Table 5-1. EWCTS Recommended Improvement Projects

Project ID	Project Description	Average Score (weighted max total = 15)	Rank by Highway	Overall Rank	Project Need/Information
9-K	Extend guardrail to the south at the following locations: • MP 15.31, eastbound (for 200 feet) • MP 16.8, eastbound (for 200 feet) • MP 17.5, eastbound (for 200 feet) • MP 20.3, eastbound (for 200 feet) • MP 21.1, eastbound (for 200 feet) • MP 21.8, eastbound (for 200 feet) • MP 23.5, eastbound (for 400 feet) • MP 24.2, eastbound (for 300 feet) • MP 25.3 to MP 25.4, eastbound (add approved end section) • MP 25.4, westbound (add approved end section)	5.15	9 (tie)	18 (tie)	From safety studies. Will ultimately be included in region's guardrail program.
9-L	Raise sag curve to improve sight distance, MP 18.1, both directions.	5.2	7	16 (tie)	From safety studies.
9-M	Construct climbing and passing lanes as follows: • Climbing lanes, MP 16.1 to MP 15.8, westbound • Passing lane, MP 15.0 to MP 15.6, eastbound • Passing lane, MP 20.6 to MP 23.5, both directions • Climbing lane, MP 26.7 to 26.3, westbound	7.075	3 (tie)	7 (tie)	From safety studies.
9-N	Add attenuator to barrier ends at the following locations: • MP 17.28, eastbound (note: error in MP system) • MP 25.39, both directions	3.875	11 (tie)	20 (tie)	From safety studies.
9-O	Add turn storage and signage at intersection of SR-9 and Kolob Reservoir Road to address intersection safety and address sight distance issues, MP 18.7, both directions.	8.95	1	3	From local agency comments, public comments, and safety studies. Current speed is probably too high; sight distance is limited (intersection is at the top of a hill).
9-P	Relocate/reconstruct Kolob Reservoir Road, MP 18.7, both directions.	6.975	4	9 (tie)	Modifications beyond just adding turn lanes. Timing will depend on when Virgin makes other local improvements. Might be beyond 2030.

Table 5-1. EWCTS Recommended Improvement Projects

Project ID	Project Description	Average Score (weighted max total = 15)	Rank by Highway	Overall Rank	Project Need/Information
9-Q	Add raised markers to help delineate curves, MP 27.0 thought MP 30.3, both directions.	5.8	6 (tie)	15 (tie)	From safety studies.
9-R	Remove hazardous rock wall, MP 30.0, eastbound.	3.875	11 (tie)	20 (tie)	From Horrocks evaluation. This is a private residence.
9-S	Rehabilitate the following structures: • 0 F 468 (North Creek), MP 19.3 • 0 F 82 (Springdale Wash), MP 31.5 (consider replacing in 10–15 years)	5.15	9 (tie)	18 (tie)	
State Route 17, La Verkin to I-15					
17-A	Add backup power source to signal at intersection with SR-9, MP 0.	5.15	8 (tie)	18 (tie)	From local agency. Power outages several times a year create hazards because lights go completely dark when power fails. Tourists and others unfamiliar with the area do not know to stop, which has resulted in dangerous conflicts, especially at night.
17-B	Add rumble strips (both directions) between the following points: • MP 1.9 to MP 2.9 • MP 3.5 to MP 5.8	5.15	8 (tie)	18 (tie)	From safety studies and public comments. Shoulder and center rumble strips are recommended for all corridors by UHP. Immediate need identified for center rumble strip at about MP 2.5; problem with drifting over the center line.
17-C	Widen clear zone, install retaining walls to accommodate wider shoulder, MP 0.26 to MP 0.6, both directions but especially northbound.	5.8	6	15 (tie)	From the City. Debris falls onto the road from the east side, and the west side is undercut pretty severely in some places. Extends from end of existing sidewalk to La Verkin Creek Bridge. The City also asked for sidewalk extension; could be coordinated through this.
17-D	Add two-way left-turn lanes (permissive) between the following points: • MP 0.6 to MP 0.9 (begin flare at north end of La Verkin Creek Bridge) • MP 1.5 to MP 2.0 • MP 2.8 to MP 3.4 (through Toquerville)	8.3	1	5 (tie)	From public comments and safety study (two-way left-turn lane through Toquerville). Toquerville residents do not want a two-way left-turn lane through town. Might not be needed if a bypass is constructed. Could restripe existing pavement to accommodate a two-way left-turn lane through this area.
17-E	Repair pavement at La Verkin Creek Bridge and repair bridge rail transition on bridge approach (northbound), MP 0.6.	5.15	8 (tie)	18 (tie)	From safety studies (barrier) and city and public comments (pavement). Pavement has settled, resulting in a bump at about MP 0.6. Noisy for residents living adjacent to the road.

Table 5-1. EWCTS Recommended Improvement Projects

Project ID	Project Description	Average Score (weighted max total = 15)	Rank by Highway	Overall Rank	Project Need/Information
17-F	Widen shoulders to standard between the following points: • MP 0.83, extend northbound • MP 0.87 to MP 2.2, both directions • MP 3.5 to MP 5.8, both directions	6.35	4	11	From safety studies.
17-G	Improve curve safety by adding left-turn storage, MP 1.2, southbound *(also see items 17-I and 17-K)*.	7.05	2	8	From public comments. The curve was recently widened to the inside to accommodate a new turn lane for a subdivision, but this item is focused on the outside of the curve. Not included in the safety study, but identified as a problem by the public.
17-H	Replace "Texas turndown" guardrail, extend guardrail as needed in the following locations: • MP 1.48, northbound • MP 4.07, southbound	5.15	8 (tie)	18 (tie)	From safety studies. Will ultimately be included in region's guardrail program.
17-I	Install barrier or guardrail between the following points: • MP 1.2 to MP 1.0, southbound *(also see items 17-G and 17K)* • MP 1.4 to MP 1.3, northbound (extend guardrail back to bottom of slope, about 500 feet) • MP 2.6 to MP 2.8, southbound • MP 4.07 (update and replace this section of guardrail)	5.15	8 (tie)	18 (tie)	From safety studies.
17-J	Construct passing lanes, MP 4.3 to MP 4.9, both directions.	6.425	3	10	From safety studies.
17-K	Improve curve delineation in the following locations: • MP 1.2 to MP 1.0, southbound (also see items 17-I and 17-G) • MP 5.08 to MP 5.52, northbound	5.175	7	17(tie)	From safety studies.
17-L	Widen highway to four lanes.	5.9	5	13	From Horrocks evaluation. Might not be necessary if Toquerville bypass is constructed.

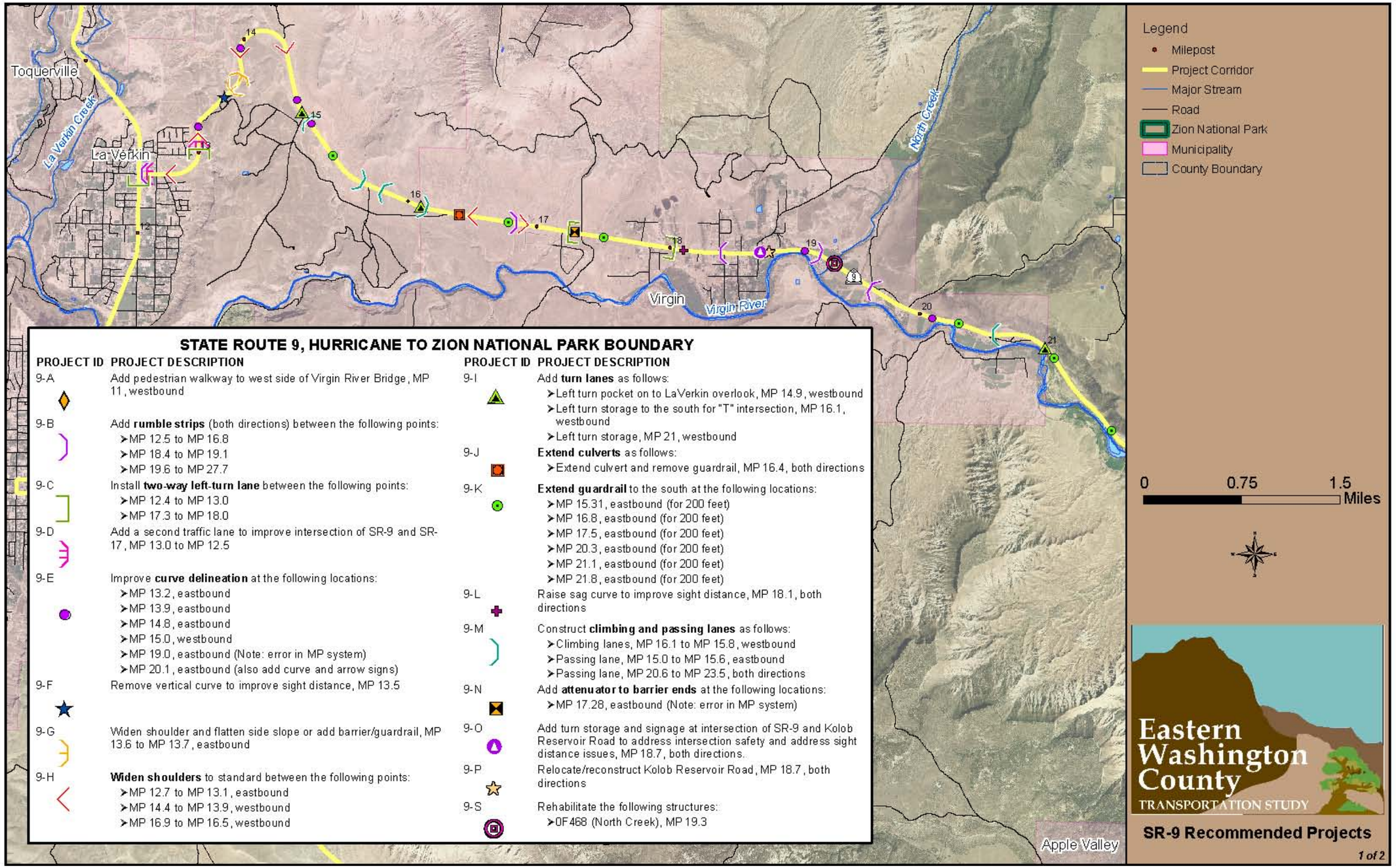
Table 5-1. EWCTS Recommended Improvement Projects

Project ID	Project Description	Average Score (weighted max total = 15)	Rank by Highway	Overall Rank	Project Need/Information
State Route 59, Utah–Arizona Border to Hurricane					
59-A	Initiate study to determine best solution for addressing circulation, congestion, and safety issues associated with the intersection of SR-59 and SR-9 in Hurricane. Develop preferred solution as needed to carry project through funding and environmental.	12.025	1	1	From public comments and the City. Two general well-known options are: • Reconstruct/reconfigure existing intersection. • Reroute to intersect/connect in a different location.
59-B	Add rumble strips, MP 0 to MP 22, both directions.	5.15	8 (tie)	18 (tie)	From safety study. Shoulder and center rumble strips are recommended for all corridors by UHP.
59-C	Widen shoulders to standard along the entire corridor (MP 0 to MP 22), but especially between the following points: • MP 22.0 to MP 21.1, southbound • MP 19.6 to MP 20.3, both directions • MP 17.3 to MP 17.8, southbound • MP 12.3 to MP 12.7, northbound	6.975	5	9 (tie)	From public comments, City (Apple Valley), and safety studies. Would also address public comments regarding the need for a wider shoulder to accommodate bicycle use. Specific mention of MP 20–MP 22 in public comments. Other work at SR-9/SR-59 intersection might also address the need at MP 22.0.
59-D	Construct two-way left-turn lanes in the following locations: • Extend existing MP 0.64 to MP 0.27, southbound • MP 4.5 to MP 5.4 • Extend existing MP 9.8 to MP 10.1 • Extend existing MP 10.5 to MP 10.7	8.925	3	4	From public comments, the City, and safety studies. High-speed traffic and a lack of shoulders and turn lanes make turning movements onto side roads dangerous. Would need to be coordinated with passing-lane projects. Apple Valley also requested a continuous two-way left-turn lane between about MP 8 and MP 12; might want to add a two-way left-turn lane at about MP 8 as Apple Valley expects this intersection to become critical as the area develops over the next 5 years.
59-E	Construct climbing and passing lanes as follows: • Passing lane, MP 2.0 to MP 3.5, both directions • Passing lane, MP 8.2 to MP 9.1, both directions • Climbing lane, MP 13.0 to MP 14.1, both directions • Extend passing lane, MP 15.7 to MP 17.0, southbound • Passing lane, MP 15.7 to MP 17.0, northbound • Passing lane, MP 19.5 to MP 18.0, northbound	7.65	4	6	From safety studies and public comments.

Table 5-1. EWCTS Recommended Improvement Projects

Project ID	Project Description	Average Score (weighted max total = 15)	Rank by Highway	Overall Rank	Project Need/Information
59-F	Construct right- and left-turn lanes (for storage) at the following locations: • Left-turn storage, MP 8.1 (Apple Valley Main Street), both directions • Right-turn storage, MP 11.9, both directions • Left-turn storage, MP 14.6 (Kokopelli Golf Course), northbound • Left-turn storage, MP 21.2, southbound • Add left-turn lanes to improve intersection, MP 22.02 (100 South and 100 East in Hurricane), both directions • Add left-turn lanes to improve intersection, MP 22.05 (Main St. and 100 South in Hurricane), both directions	9.5	2	2	From safety studies, public comments, and the City. High speeds make turning movements dangerous between about MP 0 and MP 18. Geographic constraints contribute to the need for safe turning movements between about MP 18 and MP 22 (Hurricane Cliffs area).
59-G	Widen clear zone in the following locations: • MP 9.88, northbound • MP 16.83, southbound • MP 17.05, southbound • MP 20.25, southbound • MP 21.92, southbound	5.825	6	14	From safety studies.
59-H	Repair 4-inch edge drop, MP 16.4, southbound.	5.175	7	17 (tie)	From safety studies.
59-I	Install barrier, MP 19.6 to MP 20.0, northbound.	5.15	8 (tie)	18 (tie)	From safety studies.
59-J	Add supports to guardrail, MP 21.95, southbound.	3.2	9	21	From safety studies.

Figure 6. SR-9 Recommended Projects (1 of 2)



STATE ROUTE 9, HURRICANE TO ZION NATIONAL PARK BOUNDARY

PROJECT ID	PROJECT DESCRIPTION
9-A	Add pedestrian walkway to west side of Virgin River Bridge, MP 11, westbound
9-B	Add **rumble strips** (both directions) between the following points: ➢MP 12.5 to MP 16.8 ➢MP 18.4 to MP 19.1 ➢MP 19.6 to MP 27.7
9-C	Install **two-way left-turn lane** between the following points: ➢MP 12.4 to MP 13.0 ➢MP 17.3 to MP 18.0
9-D	Add a second traffic lane to improve intersection of SR-9 and SR-17, MP 13.0 to MP 12.5
9-E	Improve **curve delineation** at the following locations: ➢MP 13.2, eastbound ➢MP 13.9, eastbound ➢MP 14.8, eastbound ➢MP 15.0, westbound ➢MP 19.0, eastbound (Note: error in MP system) ➢MP 20.1, eastbound (also add curve and arrow signs)
9-F	Remove vertical curve to improve sight distance, MP 13.5
9-G	Widen shoulder and flatten side slope or add barrier/guardrail, MP 13.6 to MP 13.7, eastbound
9-H	**Widen shoulders** to standard between the following points: ➢MP 12.7 to MP 13.1, eastbound ➢MP 14.4 to MP 13.9, westbound ➢MP 16.9 to MP 16.5, westbound
9-I	Add **turn lanes** as follows: ➢Left turn pocket on to LaVerkin overlook, MP 14.9, westbound ➢Left turn storage to the south for "T" intersection, MP 16.1, westbound ➢Left turn storage, MP 21, westbound
9-J	**Extend culverts** as follows: ➢Extend culvert and remove guardrail, MP 16.4, both directions
9-K	**Extend guardrail** to the south at the following locations: ➢MP 15.31, eastbound (for 200 feet) ➢MP 16.8, eastbound (for 200 feet) ➢MP 17.5, eastbound (for 200 feet) ➢MP 20.3, eastbound (for 200 feet) ➢MP 21.1, eastbound (for 200 feet) ➢MP 21.8, eastbound (for 200 feet)
9-L	Raise sag curve to improve sight distance, MP 18.1, both directions
9-M	Construct **climbing and passing lanes** as follows: ➢Climbing lanes, MP 16.1 to MP 15.8, westbound ➢Passing lane, MP 15.0 to MP 15.6, eastbound ➢Passing lane, MP 20.6 to MP 23.5, both directions
9-N	Add **attenuator to barrier ends** at the following locations: ➢MP 17.28, eastbound (Note: error in MP system)
9-O	Add turn storage and signage at intersection of SR-9 and Kolob Reservoir Road to address intersection safety and address sight distance issues, MP 18.7, both directions.
9-P	Relocate/reconstruct Kolob Reservoir Road, MP 18.7, both directions
9-S	Rehabilitate the following structures: ➢0F468 (North Creek), MP 19.3

Figure 7. SR-9 Recommended Projects (2 of 2)

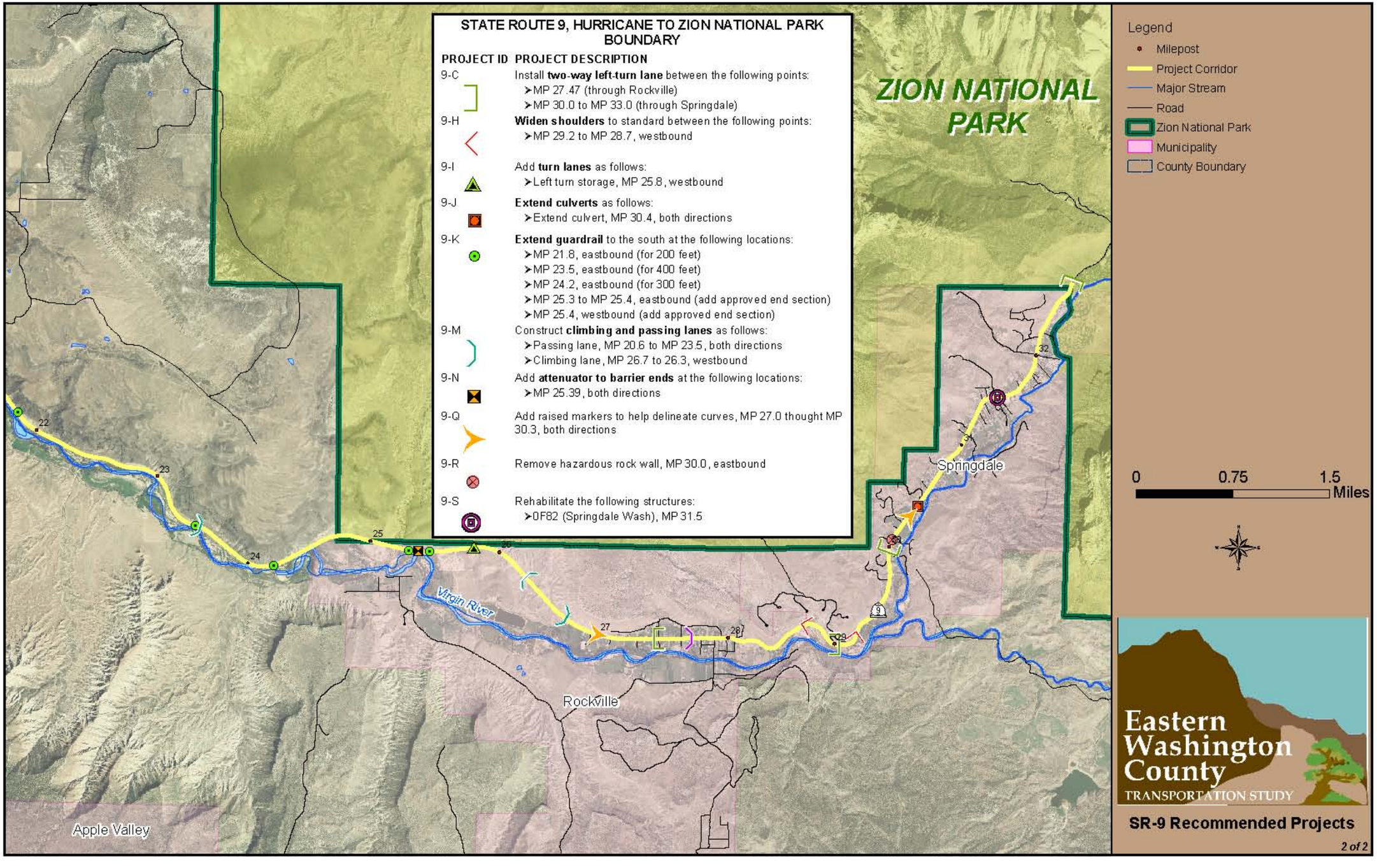


Figure 8. SR-17 Recommended Projects (1 of 2)

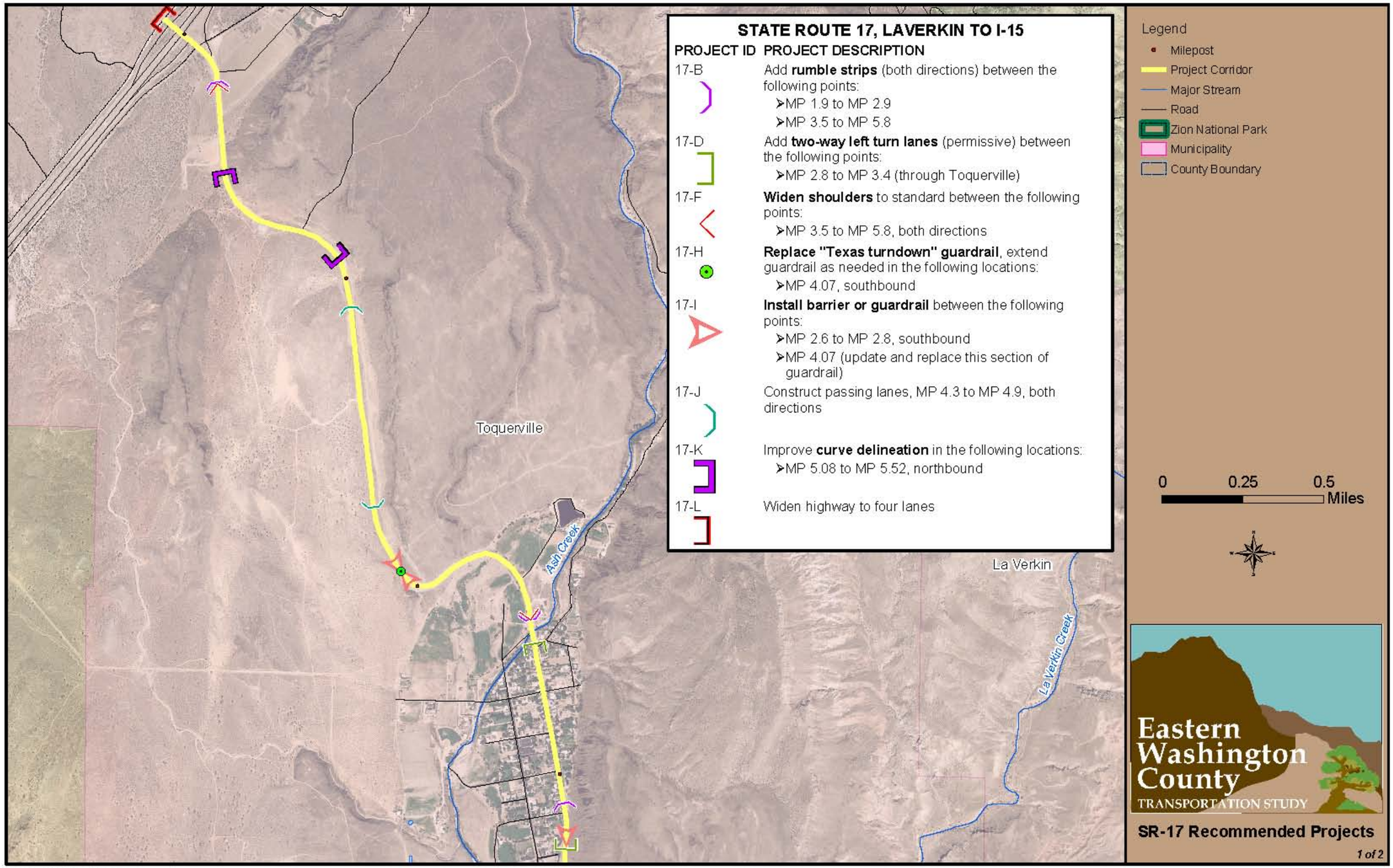


Figure 9. SR-17 Recommended Projects (2 of 2)

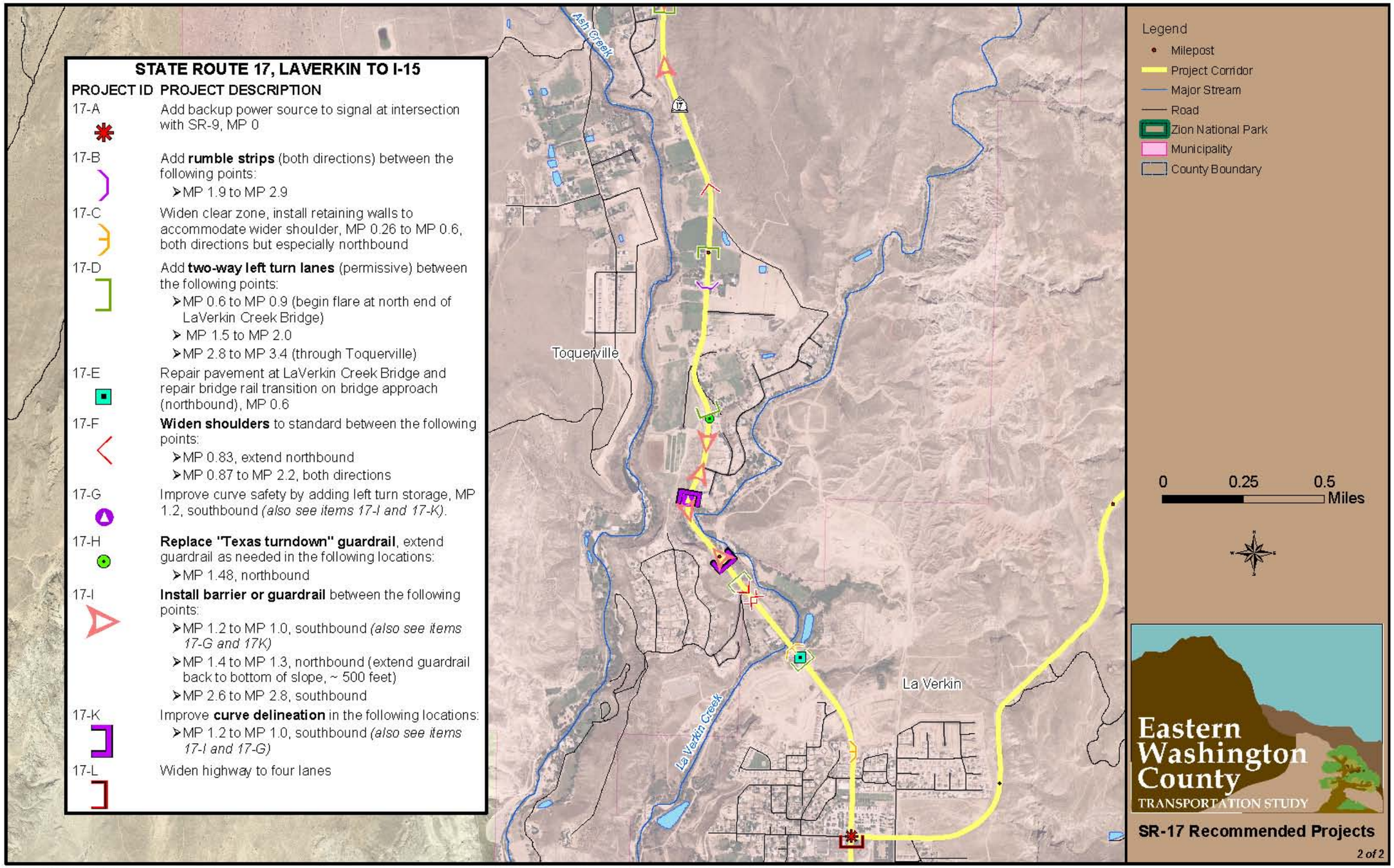


Figure 10. SR-59 Recommended Projects (1 of 2)

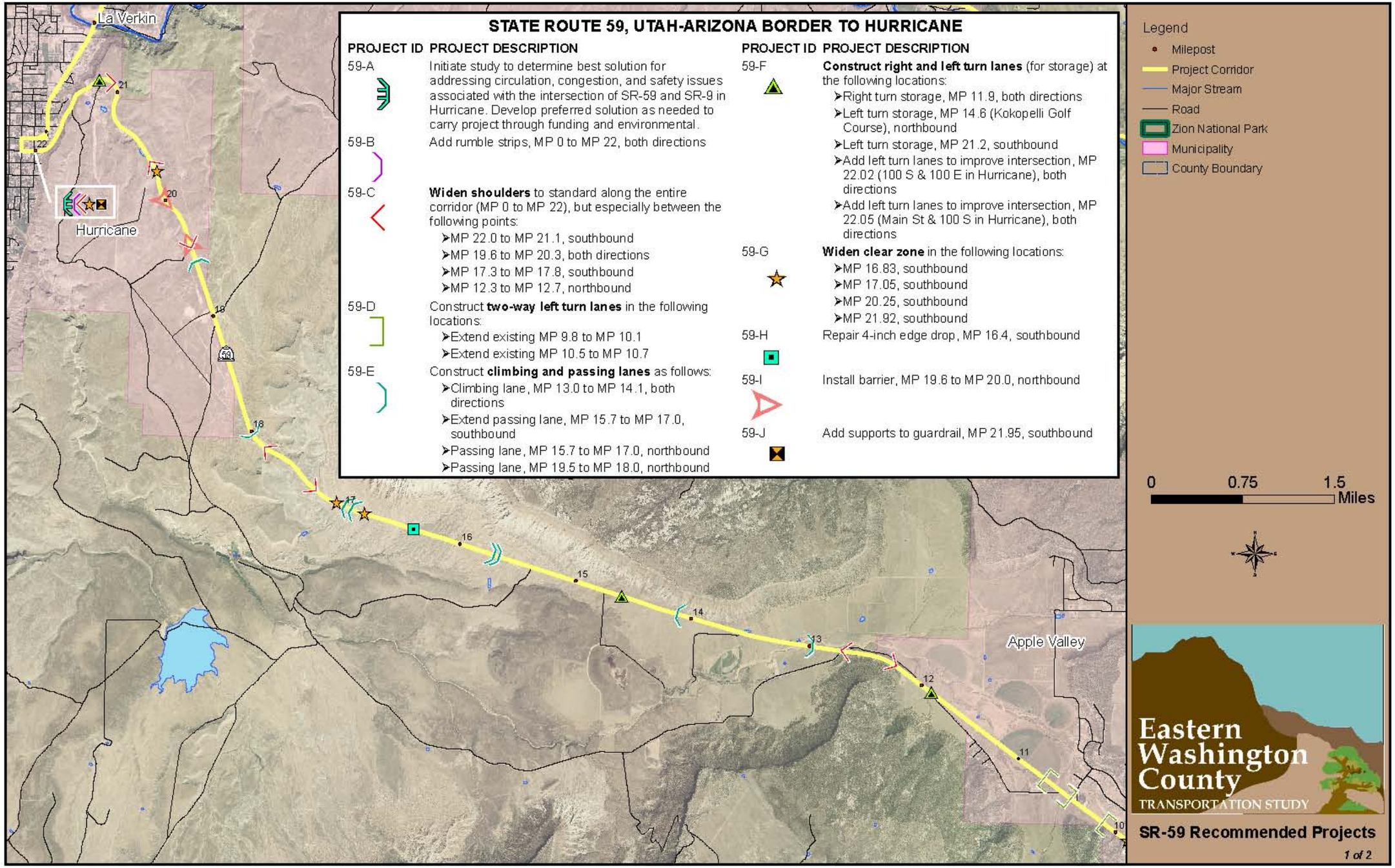


Figure 11. SR-59 Recommended Projects (2 of 2)

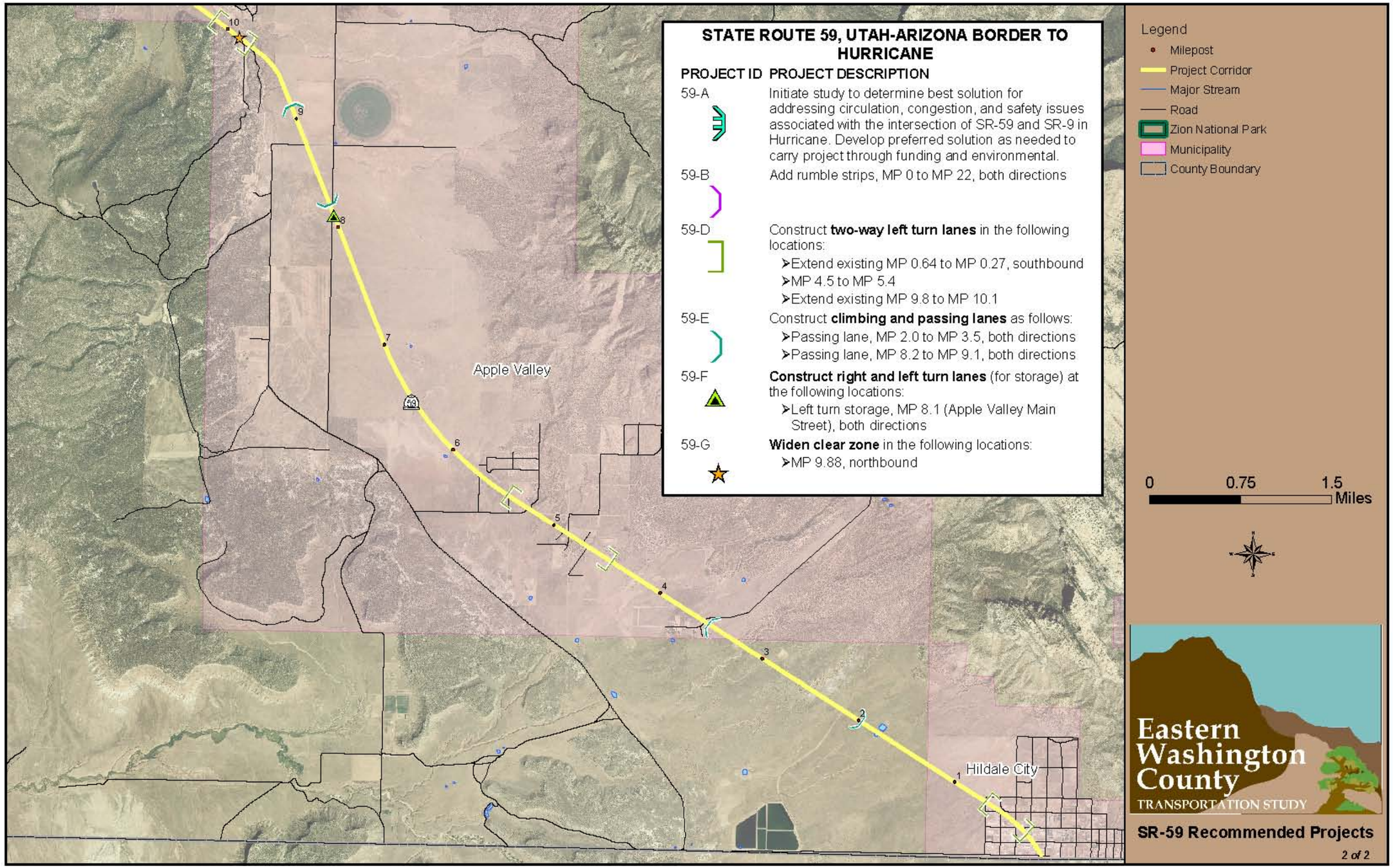


Table 5-2. EWCTS Recommended Coordination Agreements and Programs

Agreement/Program	Timeframe
Sign Programs (all highways): Evaluate types and locations of signs needed and develop plan/schedule for installation. • SR-9 sign program should include multiple-language signs, directional signs for Zion National Park, "share the road" signs, signs as listed in the Horrocks Safety Study, and sign needs identified by the public and agencies (for example, intersections, pedestrians). • SR-17 sign program should include multiple-language signs, directional signs for Zion National park, signs as listed in the Horrocks Safety Study, and sign needs identified by the public and agencies. • SR-59 sign program should include directional signs for BLM recreation areas (Gooseberry Mesa, Little Creek Mesa), signs as listed in the Horrocks Safety Study, and sign needs identified by the public and agencies.	One-time development of plan, ongoing coordination with other projects and programs
Culvert Program (all highways): Catalogue conditions of all culverts along corridors, identify needed modifications (mostly lengthening to allow for clear-zone improvements), and prioritize/schedule needed improvements.	One-time development of plan, ongoing coordination with other UDOT projects and programs
SR-9 Slow Vehicle Coordination: UDOT to work with school districts, towns, and the Zion Canyon Corridor Committee to identify locations where pull-outs are needed. Develop implementation program for construction.	Ongoing coordination with interested parties, ongoing coordination with other UDOT projects and programs
Springdale Corridor Agreement (SR-9): Develop corridor agreement with Springdale Town. Address UDOT's access-management standards, develop coordinated planning/design standards, ensure that the city and/or developers pay their fair share for improvements needed as a result of development, address compatibility between UDOT-sponsored roadway improvements and development in town, and address some of the recommendations included in the Zion Canyon Trail Feasibility Study (UDOT, no date).	Within 10 years
Toquerville Corridor Agreement (SR-17): Develop corridor agreement with the City of Toquerville. Address UDOT's access-management standards, develop coordinated planning/design standards, ensure that the city and/or developers pay their fair share for improvements needed as a result of development, address compatibility between UDOT-sponsored roadway improvements and improvements in town, and identify appropriate traffic-calming measures to reduce speeds and increase safety.	Within 10 years
La Verkin Corridor Agreement (SR-9 and SR-17): Develop corridor agreement with La Verkin City. Address UDOT's access-management standards, develop coordinated planning/design standards, ensure that the city and/or developers pay their fair share for improvements needed as a result of development, address compatibility between UDOT-sponsored roadway improvements and improvements in town, and identify appropriate traffic-calming measures to reduce speeds and increase safety.	Within 10 years
Virgin Corridor Agreement (SR-9): Develop corridor agreement with Virgin Town. Address UDOT's access-management standards, develop coordinated planning/design standards, ensure that the city and/or developers pay their fair share for improvements needed as a result of development, address compatibility between UDOT-sponsored roadway improvements and improvements in town, and identify appropriate traffic-calming measures to reduce speeds and increase safety.	Within 10 years

Table 5-2. EWCTS Recommended Coordination Agreements and Programs

Agreement/Program	Timeframe
Corridor Maintenance Coordination with Rockville and Springdale (SR-9): Develop a strategy to regularly communicate with Rockville and Springdale regarding maintenance schedules for shoulders, drainage ditches, and culverts.	Ongoing
RPO Coordination (all highways): Develop a strategy to coordinate planned highway improvements with the RPO once it is fully functional and a rural transportation plan for the RPO area is initiated.	Ongoing
BLM Coordination (all highways): Develop a strategy to coordinate highway improvements and construction with BLM in terms of access to BLM-administered land and consistency with BLM land uses. Have regular meetings with BLM to ensure that planning of both agencies is consistent with each agency's overall goals for the corridors.	Ongoing
Zion Park Transportation Coordination (SR-9): Work with the National Park Service to address management of and access to the state highway on either end of Zion National Park. Specific items that need coordination include allowing local residents to pass through the park on SR-9 between I-15 and US-89 without paying a park entrance fee and developing a long-range plan for the Zion National Park shuttle system. Work as part of a team along with the National Park Service, local governments, and private carriers to develop a long-range vision for compatible operation of SR-9 as a state highway as well as an important access to the park.	Initial effort within 5 years, ongoing thereafter
Zion Canyon Corridor Committee Coordination (SR-9): Actively participate in the Zion Canyon Corridor Committee's process to ensure compatibility between UDOT's goals and objectives and the goals and objectives of the committee.	Ongoing until committee concludes its business
Toquerville Bypass Coordination (SR-17): Work with Toquerville to develop an agreement regarding the future of SR-17 and the planned Toquerville Bypass. Focus would be to determine the feasibility of the bypass becoming SR-17, which would require coordination on access management and other UDOT standards.	When needed
SR-17/SR-9 Connector Feasibility Study: Participate in a study along with Toquerville and La Verkin to evaluate the need for and potential routes of a new connector road between SR-17 and SR-9. The new road could be a redesignated SR-17, bypassing the existing SR-17 through La Verkin.	When initiated by local governments
SR-17/I-15 Connector Feasibility Analysis: Participate in study along with local governments to evaluate the need for and potential routes of a new connector road between SR-17 and I-15 south of Leeds.	When initiated by local governments
SR-59/Southern Corridor Connector Feasibility Analysis: Participate in a study along with appropriate agencies (county, BLM, MPO) to evaluate the need for and potential routes of a new connector road between SR-59 and the Southern Corridor.	When initiated by local governments
SR-59/SR-9 Connector Feasibility Analysis: Participate in a study along with appropriate agencies (county, BLM, cities, MPO) to evaluate the need for and potential routes of a new connector road between SR-59 and SR-9. Two potential routes—Smithsonian Butte Byway and Sheep Bridge Road—currently exist as dirt roads.	When initiated by local governments

Each project identified above in Table 5-1, EWCTS Recommended Improvement Projects, is prioritized through a score, or rank. The process by which the scores were developed was both objective and subjective but ultimately represents the priority for needs along the corridor. Funding for the projects listed has not been

identified, nor has the timing and fiscal feasibility of each project or coordination effort been evaluated. The list and prioritization exercise is for planning purposes only and is intended to provide information about the needs of and recommendations for improvements along the study corridors. The implementation of projects and coordination efforts described in this study report will depend on funding, the priority of each project or effort in relation to other needs across the region, and the planning objectives of other agencies and local governments. The following sections explain the process that was used to rank projects.

Criteria

Criteria are the values against which each project was judged. The criteria used to rank the projects reflected UDOT's goals for the corridors. As described in Section 1.3, Vision, Goals, and Objectives, these goals focus on safety, operation and capacity, traffic flow as it relates to land development, and environmental considerations. The specific criteria used are described below.

Safety

- Does the project provide passing lanes?
- Does the project provide or accommodate safe pull-outs?
- Does the project improve an existing intersection that has safety issues?
- Does the project involve improvements that could be incorporated into the existing geometry such as signage, striping, rumble strips, Intelligent Transportation System (ITS) technology (such as the 511 Travel Information program used in parts of Utah), or parking restrictions?
- Does the project bring shoulders up to standard?
- Does the project address existing geometric deficiencies?
- Does the project address bicycle and pedestrian safety needs?

Operation and Capacity

- Does the project address existing or expected congestion related to traffic volume(s)? Does it improve capacity in an area that is currently or expected to be congested?
- Does the project address operational problems at intersections?
- Does the project address sight distance issues?
- Does the project improve existing surfaces and/or structures?
- Does the project improve shoulder and lane width?

Traffic Flow and Land Development

- Does the project include access controls or facilitate partnerships with local developers, ensuring that developers pay their fair share of the needed improvement(s)?
- Does the project propose a corridor agreement with a local government?
- Does the project facilitate land-use planning coordination with local governments?
- Does the project contribute to smooth regional traffic flow?

Environment

- Does the project implement Context-Sensitive Solutions that minimize impacts and enhance the natural and built environments?
- Can the project be constructed such that any impacts to the natural and built environments could be fully mitigated?
- Would construction of the project result in greater protection of adjacent natural and cultural resources?

Ranking Process

The ranking process involved members of the project team. The project team provided the first review and assigned a numeric ranking for each criterion depending on how well each project satisfied the criterion. Reviewers used a scale of 0 to 3, where 0 meant that the criterion was essentially ignored by the project or did not apply, and 3 meant that the project completely satisfied the criterion. Scores for each of the four criteria were then added for each project, by reviewer. An example is provided in Table 5-3.

Table 5-3. Initial Project Ranking Example

Project X	Score
Safety	2
Operation and capacity	3
Traffic flow and land development	1
Environmental	1
Total score	7

Once the team assigned initial "straight" scores by criterion, specific "weights" were applied to each entry. The weights are shown in Table 5-4.

Table 5-4. Weighted Project Ranking Example

Project X	Unweighted Score	Weighted Score
Safety (30%)	2	2.6
Operation and capacity (30%)	3	3.9
Traffic flow and land development (15%)	1	1.15
Environmental (25%)	1	1.25
Total score	**7**	**8.9**

The next step was to average the scores. The original and weighted reviewer scores were very similar for most projects, so the team chose not to use a weighted median.

Summary

Table 5-5 and Table 5-6 summarize the improvement project and coordination lists.

Table 5-5. Segment Summary

Highway	Length in Study Area (miles)	Number of Projects	Number of Coordination Agreements or Programs	Number of Projects/Agreements per Segment Mile
SR-9	22	19	13	1.5
SR-17	6	12	9	3.5
SR-59	22	10	6	0.7

Table 5-6. Ranking Summary

Highway	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
SR-9	9-O	9-C	9-D, 9-I[a]	9-P	9-H
SR-17	17-D	17-G	17-J	17-F	17-C
SR-59	59-A	59-F	59-D	59-E	59-C
All (combined)	59-A	59-F	9-O	59-D	9-C, 17-D[a]

See Table 5-1 above, EWCTS Recommended Improvement Projects, for detailed project descriptions.

[a] Two projects received the same score and thus are equally ranked.

As shown above in Table 5-5, Segment Summary, SR-9 has the greatest number of projects and agreements, but SR-17 has the greatest number of projects per segment mile because it is so much shorter than SR-9 or SR-59. However, as shown above in Table 5-5 and in Table 5-6, Ranking Summary, all of the corridors have top-ranked projects, with SR-59 having the most number of projects with an overall ranking of fifth or higher. SR-59 has three projects that are ranked fifth and above (ranks 1, 2, and 4) while SR-9 has two (ranks 3 and 5 [tie]) and SR-17 has one (rank 5 [tie]).

As shown above in Table 5-1, EWCTS Recommended Improvement Projects, the top three ranked projects for each corridor stand alone, with the exception of SR-9, where there are two projects that are tied for third ranking. For projects ranked fifth and lower, many projects have the same score. These results indicate that there are some higher-priority projects that should be considered first and that several other projects are also important but are probably not critical and should be considered as funding and opportunity arise.

Section 6.1, Implementation, explains how UDOT might carry out a program of actual project construction based on how the rankings are distributed. Again, this strategy is meant to be used as a guide and is not intended to dictate how and when UDOT constructs projects along the three corridors.

5.3 City Plans

In 2004 and 2005, UDOT worked with the communities of Hurricane, La Verkin, and Springdale to develop community transportation plans. During that planning process, the communities formulated lists of local improvement projects and identified priorities. Because such intensive planning for roads in and near these cities had already been completed at the local level, the study team felt it was important to consider the cities' priorities along the project corridors as it developed the project lists. Table 5-7 below summarizes the projects included in the community plans that occur along the project corridors and how the EWCTS project lists address the community priorities.

Table 5-7. Community Transportation Plan Recommendations

Project in Community Plan	Status
Hurricane (SR-9)	
Priority Project: Realign SR-59 to intersect with SR-9 at 600 North	Issue would be addressed through EWCTS Project 59-A.
Priority Project: Widen SR-9 between 300 West and 600 North	This section of roadway was addressed in a 2005 environmental/concept study (SP-0009[11]10E). Not included on the EWCTS project lists.
Landscape beautification between 6300 West and 900 North	Not included as a stand-alone project in the EWCTS project lists. Improvements in the EWCTS study area could be incorporated into SR-9 improvements evaluated in the 2005 study (SP-0009[11]10E).
La Verkin (SR-9 and SR-17)	
Priority Project: Landscaping/beautification along SR-9 in city limits; add gateway features at city entrances	Could be addressed through corridor agreement with the City, which is included on the EWCTS list of coordination agreements and programs (see Table 5-2 above, EWCTS Recommended Coordination Agreements and Programs).
Priority Project: Sidewalk improvements along SR-9 and SR-17	Some sidewalks have been constructed. Additional sidewalk along state routes could be constructed as part of UDOT road projects (see EWCTS Projects 17-C and 17-F). Not listed as a stand-alone project on the EWCTS lists.
Priority Project: Speed review on SR-9 through La Verkin	Speed studies are initiated by local governments. City responsible for following through with formal request. Not included as a stand-alone project on the EWCTS lists.
Priority Project: La Verkin/Hurricane pedestrian bridge crossing on SR-9	Pedestrian structure constructed on east side. EWCTS Project 9-A addresses pedestrian structure on west side.
Turn lanes at the following locations on SR-9: • 100 East (Valley View Drive) • Main Street	100 East turn lane incorporated into EWCTS Projects 9-C and 9-D. Main Street turn lane not included as a stand-alone EWCTS project.
Signage Projects: • Check and place new/additional directional signage at SR-9 and SR-17 intersection • Install advance warning signage at the southbound crossing of Virgin River	Could be incorporated into the SR-9 and SR-17 sign programs listed in Table 5-2. Sign program expected to include new/additional directional signage for Zion National Park at intersection of SR-9 and SR-17.
Widen SR-9 from Main Street to new Top Side development	EWCTS Project 9-H calls for shoulder widening through part of this area. No new lanes proposed at this time.
Widen shoulders along SR-9 between Virgin River Bridge and SR-17 for parking	Not included as a stand-alone project on the EWCTS lists. Parking issues could be partially addressed through the proposed corridor agreement with La Verkin. Current road width (four lanes) is sufficient to handle 2035 expected traffic volumes through La Verkin at level of service (LOS) D; future widening not a critical traffic need between now and 2035.
Evaluate striping along SR-9 between intersection with SR-17 and the top of the "Twist"	Not included as a stand-alone project on the EWCTS lists. Shoulder, curve, and guardrail issues addressed through EWCTS Projects 9-B, 9-E, 9-F, 9-G, 9-H, and 9-K.
Pull back slopes and install retaining walls along SR-17 between 500 North and 800 North	Issue addressed in EWCTS Project 17-C.

Table 5-7. Community Transportation Plan Recommendations

Project in Community Plan	Status
Widen and improve SR-17 from La Verkin to Toquerville	Not included as a stand-alone project on the EWCTS lists. Shoulder widening, rumble strips, and turn lanes between about MP 0.5 and MP 2.5 addressed in EWCTS Projects 17-B, 17-C, 17-D, 17-E, 17-F, 17-G, 17-H, 17-I, and 17-K.
Add new signals at the following locations: • Main Street crossing of SR-9 • 480 South crossing of SR-9 (when new school is built)	Not included as stand-alone projects on the EWCTS project lists. City should formally request signal study for Main Street crossing (August 2008 signal warrant list does not include this intersection). 480 South crossing should be evaluated at the time the new school is constructed/ opened.
Add new school crossing at Main Street crossing of SR-9	Not included as a stand-alone project on the EWCTS project lists. Issue could partially be addressed by providing the pedestrian walkway on the west side of Virgin River Bridge (EWCTS Project 9-A).
Springdale (SR-9)	
Priority Project: Improve intersection of SR-9 and Paradise Road	Not included as a stand-alone project on the EWCTS list. Project 9-C includes a two-way left-turn lane that could address intersection problems associated with turn movements.
Priority Project: Sidewalks throughout city	Sidewalk could be constructed as part of local projects or in conjunction with local improvements addressed in the proposed corridor agreement with Springdale (see Table 5-2). Not listed as a stand-alone project on the EWCTS lists.
Priority Project: Shielded lighting throughout city	Appropriate to install as part of local projects. Could be addressed in the proposed corridor agreement with Springdale (see Table 5-2). Not listed as a stand-alone project on the EWCTS lists.
Priority Project: Speed study through city (reduce speed)	Speed studies are initiated by local governments. City responsible for following through with formal request. Not included as a stand-alone project on the EWCTS lists.
Priority Project: Zion Canyon bicycle/pedestrian trail (study and construction)	Not included as a stand-alone project on the EWCTS lists. Trail feasibility study already completed (UDOT, no date). Construction could be part of a cooperative project that includes UDOT making improvements to shoulders west of Springdale (see Project 9-H) that would allow connection to a town-constructed bicycle/pedestrian path.
Culvert maintenance plan review	Culvert program included on the EWCTS list of coordination agreements and programs (see Table 5-2).
Shoulder maintenance plan review	Corridor maintenance coordination with Rockville and Springdale included on the EWCTS list of coordination agreements and programs (see Table 5-2).
Review current passing/no-passing striping between Springdale and La Verkin	Not included as a stand-alone project on the EWCTS lists. Some preliminary evaluation completed as part of the safety study for the EWCTS. Passing needs identified and included as EWCTS Project 9-M.
Identify future passing needs along highway between La Verkin and Rockville	Passing lanes addressed in EWCTS Project 9-M.
Improve (widen) shoulders between Rockville and Springdale	Shoulder widening addressed in EWCTS Project 9-H.
Add signage for Zion National Park parking lots	Could be addressed through SR-9 sign program described on Table 5-2.

Sources: UDOT 2004b, 2005, 2006b

5.4 Access-Management Recommendations

UDOT recognizes that corridor management is a primary policy concern along all three study corridors. Corridor management involves the application of strategies for access management, land-use and subdivision management, right-of-way needs and preservation, operational strategies, intergovernmental coordination, and financing of corridor improvements. The access-management element involves identifying the types, locations, and configurations of permitted access along a corridor to preserve the safety and mobility of major thoroughfares by managing the number of conflict points.

Corridor planning is an appropriate time to start investigating the establishment of detailed agreements between UDOT and the local agencies that are responsible for implementing land use along the study corridors. There is a close relationship between transportation and land uses, because all land use depends to some extent on access to a road to bring people to and from the use. All roads have access points, whether these are individual driveways, local road intersections, or fully controlled interchanges.

Access-management problems arise when the function of a road is out of balance with normal demands. If a highway corridor designed for moving traffic runs through the heart of a community and has many businesses and roads that access the corridor, then through-traffic movements can be negatively affected. However, business owners like to have access to higher-volume roads to bring in more customers, which ensures the businesses' long-term viability. This is especially important on corridors that have heavy tourist and recreation-based traffic and/or that provide important regional connections, such as SR-9, SR-17, and SR-59.

Access points along the road and traffic movement can be in conflict when communities grow without establishing location options for business other than a highway or a main street. If business districts and highways share a route—as SR-9 does through Virgin, Rockville, and Springdale; SR-17 does through Toquerville and La Verkin; and SR-59 does through Hurricane, Apple Valley, and Hildale—then the function of the road for either purpose must be carefully addressed every time there is a proposal for a roadway improvement or new development in the town or city to ensure that the road can meet the critical needs of both access and mobility. The cities must ensure that accesses to locally approved development meet UDOT's access standards. As part of a city's approval process, developers must be willing to pay their fair share of modifications to the state highway system that otherwise would not be required (such as the construction of a new turn lane to serve a new development).

A growing number of transportation agencies are engaging in corridor access management through developing strategies and agreements. Some access issues along the corridors would be addressed by implementing the project recommendations presented in Table 5-1 above, EWCTS Recommended Improvement Projects, and Table 5-2 above, EWCTS Recommended Coordination Agreements and Programs. However, the more-detailed work of establishing access-management agreements, adopting corridor-management policies, following through with land-use coordination, and establishing urban routing will continue in the future.

The corridor planning process can be used to craft local agreements concerning access management along the SR-9, SR-17, and SR-59 corridors. The results of coordination with the public, stakeholders, and local agencies along these corridors suggest that an open, collaborative process favored by all parties will help implement effective agreements and/or policies. By using a consensus-based approach, UDOT and the local agencies will craft agreements that are mutually acceptable and have the support necessary to implement the intent of the agreement.

In general, the project team recommends that UDOT enter into some type of corridor-management agreement with each city or town along each of the corridors. UDOT currently has an agreement with Hurricane along SR-9 from I-15 to the Virgin River Bridge at about MP 11. A copy of this agreement is included in Appendix C, SR-9 Cooperative Corridor Preservation Agreement.

In the absence of formal agreements, the consideration and evaluation of accesses along each corridor should be based on the UDOT Accommodation of Utilities and the Control and Protection of State Highway Rights-of-Way (Utah Administrative Code, Rule R930-6). That rule, which is also discussed in Section 2.2, Roadway Characteristics, outlines recommended access-control policies and procedures for state highways based on the functional classification of the roadway. It provides recommendations for access locations, spacing, and configurations. Each time a new or revised access is proposed, the permitting review and approval process should start with the information in the UDOT right-of-way manual.

The following sections describe the general access conflicts along each of the study corridors.

5.4.1 SR-9

As the only access corridor to Zion National Park, SR-9 will always serve the multiple roles of providing access to local land uses and supporting the tourist and recreational demands of the area. This will require close coordination between each town and UDOT to develop access-management plans and/or agreements that can meet the various needs and demands of the corridor. Each of the communities along the corridor—La Verkin, Virgin, Rockville, and Springdale—has expressed an interest in developing a corridor management agreement with UDOT. These agreements should address items such as:

- Driveway locations
- Intersection locations
- Future traffic signal locations
- Need for acceleration and deceleration lanes
- Need for pull-outs for trailheads, historical markers, scenic view points, etc.
- Opportunities to combine, limit, eliminate, or restrict accesses (right-in-right-out versus full access)
- Speed limits

These agreements will be an important part in ensuring the long-term success of the corridor.

5.4.2 SR-17

SR-17, which serves both as an important regional route between SR-59 and I-15 and as the main local access route through Toquerville and La Verkin, will require special attention to balance the access and mobility needs of the corridor. Along this route, many residences and businesses depend on the corridor to meet access and travel needs. Of special concern on this route are the competing factors of Toquerville's vision to preserve SR-17 as a slower-speed, two-lane road and the regional travel demands that indicate a need for SR-17 to serve as a multiple-lane, higher-speed corridor.

To address this issue, Toquerville has been actively planning a bypass route around the town. Toquerville would like the bypass to serve as SR-17, which would allow the town to maintain the existing route as a local road. If bypass construction is funded, UDOT should work with Toquerville to make sure that the development of the bypass route would meet state design and access standards if the bypass route replaces the existing SR-17 corridor as the main state route through this area.

Whether or not the bypass route is constructed, UDOT should develop a corridor agreement with Toquerville and La Verkin to address access standards and access management along SR-17. An agreement for this highway would likely include the following key components:

- Driveway locations
- Intersection locations
- Future traffic signal locations
- Need for acceleration and deceleration lanes
- Opportunities to combine, limit, eliminate, or restrict accesses (right-in-right-out versus full access)
- Special considerations for heavy truck traffic
- Speed limits

5.4.3 SR-59

SR-59 is a regionally important route that connects northern Arizona to I-15. For this reason, it carries a lot of heavy regional and interstate truck traffic in addition to local, recreational, and tourist traffic. The length of the route (about 22 miles in Utah) indicates that a safe, higher-speed route is desirable to meet the mobility needs of the corridor.

The communities of Hildale, Apple Valley, and Hurricane should develop access-management agreements with UDOT. These agreements should address:

- Driveway locations
- Intersection locations
- Future traffic signal locations
- The need for and location of future grade-separated interchange locations (probably beyond 2035)
- Need for acceleration and deceleration lanes
- Opportunities to combine, limit, eliminate, or restrict accesses (right-in-right-out versus full access)
- Need for pull-outs for trailheads and recreational areas
- Special considerations for heavy truck traffic
- Speed limits

A key element of corridor agreements along SR-59 would be identifying primary access locations and types to accommodate the future planned development in these areas. Land development could push toward multiple access locations along the highway, but the mobility needs of the corridor suggest that fewer accesses would be better. To resolve this issue, the study team suggests that UDOT consider constructing smaller, local grade-separated interchanges similar to the Ledges interchange on SR-18. Small interchanges such as these would provide a higher-volume access in a much safer scenario than traffic signals on the higher-speed corridor. Since much of the adjacent land is not yet developed, the local road system could be planned out in such a way as to route traffic to these interchange locations and eliminate the need for multiple intersections along the corridor. If the interchanges are not needed until after 2035, the consolidation of access points into single at-grade intersections would still provide an access management benefit for UDOT.

6.0 Implementation Plan and Cost Estimates

6.1 Implementation

Table 5-1 above, EWCTS Recommended Improvement Projects, lists a rank for each of the proposed improvement projects along the study corridors but does not identify a logical implementation sequence. The order in which projects are constructed largely depends on funding and priority (need), but the relationship of a proposed project to other recent or imminent projects in the vicinity also affects the sequence in which the projects can or should be constructed.

Funding has always been a challenge for UDOT. It is not likely that all of the projects listed in Table 5-1 above will be funded between now and 2035. Some projects might become obsolete as other improvements are constructed, and some could be combined into a single effort if they are close geographically. In such cases, it makes more sense to direct the limited funding that is available to other efforts.

Table 6-1 below suggests an implementation strategy that focuses primarily on the geographic distribution of projects. The strategy also considers project rankings and other "what-if" considerations along the three highways. Construction of higher-ranked projects (such as passing lanes, turn lanes, and shoulder improvements) could result in large areas of disturbance, including areas that are the subject of lower-ranked projects. In many cases, it would make sense to include the lower-ranked projects as part of overall construction of higher-ranked projects.

Table 6-1. EWCTS Project Implementation Strategy

Milepost Limits	Coordinating Projects	Description of Activity
SR-9 – Hurricane to Springdale		
General Notes: Of the three study corridors, this segment of SR-9 has the highest number of projects. As described in the following table items, most projects on the project list could be constructed in coordination with other projects. Some projects, including adding a pedestrian walkway to the Virgin River Bridge (Project 9-A at MP 11), improvements to the Kolob Reservoir Road intersection (Projects 9-O and 9-P at MP 18.7), and rehabilitation of the North Creek Bridge (Project 9-S at MP 19.3), aren't included in the implementation strategy described below. Construction of these projects, especially Project 9-O, should be considered as stand-alone projects as UDOT continues to program funding over the next 20 years. The two-way left-turn lane between MP 17.3 and MP 18.0 would likely be constructed as a stand-alone project or in coordination with future through-town improvements, such as traffic-calming, through the town of Virgin. Because some Virgin residents have stated that they do not want a two-way left-turn lane through town, this project should not be constructed until a corridor agreement, as listed in Table 5-2 above, EWCTS Recommended Coordination Agreements and Programs, is reached with Virgin. Rockville has also stated that it does not want to have a two-way left-turn lane constructed through town. UDOT should consider further coordination with Rockville before it plans and/or programs a two-way left-turn through the town. Guardrail and barrier attenuator projects are not included in the list below. Rather than complete these projects on a segment basis, UDOT would probably instead make the improvements through a barrier program that applies to the entire corridor. In some cases, barriers could be improved as part of other projects (such as the guardrail extension needed at MP 21.8 and MP 23.5, which could be installed as part of the passing-lanes project between MP 20.6 and MP 23.5), but the strategy below assumes that guardrail and barrier projects would be constructed on a stand-alone basis. Finally, curve improvements needed at MP 18, MP 19, and MP 20 (Project 9-L and Project 9-E) might need to be constructed as stand-alone projects. The following list describes a potential implementation strategy for projects that can be coordinated along four segments of SR-9.		
12 to 15 (La Verkin through the "Twist")	• 9-B (rumble strips) • 9-C (two-way left-turn lanes) • 9-D (additional traffic lane) • 9-E (improve curve delineation) • 9-F and 9-G (curve and clear-zone improvements) • 9-H (shoulder widening) • 9-I (turn lane) • 9-M (passing lane)	This section is primarily in need of improvements due to topographic conditions. Improvements would probably be phased with the most critical needs constructed first (such as Project 9-D from MP 12.5 to MP 13.0, which overlaps with the two-way left-turn lane listed under Project 9-C, MP 12.4 to MP 13.0). Shoulder widening (Project 9-H, MP 12.7 to MP 13.1 and MP 13.9 to MP 14.4) and curve improvements (Project 9-E, MP 13.2, MP 13.9, MP 14.8, and MP 15.0; and Projects 9-F and 9-G, MP 13.5 to MP 13.7) could be constructed simultaneously. The turn lane at the La Verkin overlook (Project 9-I, MP 14.9) could be constructed along with the passing-lane project that would start at about MP 15 (Project 9-M). Rumble strips (Project 9-B) could be added at any time, although it is logical to assume that some of the rumble strips would be added as part of curve improvements (Project 9-E) and shoulder widening (Project 9-H).

Table 6-1. EWCTS Project Implementation Strategy

Milepost Limits	Coordinating Projects	Description of Activity
15 to 18 (Top of "Twist" to Virgin)	• 9-B (rumble strips) • 9-H (shoulder widening) • 9-I (turn lane) • 9-J (culvert extension) • 9-M (passing lanes)	This section is mostly open highway and gives eastbound travelers the first opportunity to pass slower traffic after coming through the "Twist" and the last opportunity for westbound travelers to pass before going into the "Twist." Because of their locations, the needed passing lanes (Project 9-M, MP 15.0 to MP 15.6 and MP 15.8 to MP 16.1) and the turn lane at MP 16.1 (Project 9-I), which are the highest-priority projects, could be constructed at the same time. The culvert extension identified for MP 16.4 (Project 9-J) could be constructed at the same time the shoulder improvements between MP 16.5 and 16.9 (Project 9-H) are constructed. Rumble strips (Project 9-B) from MP 16.8 and to the west could be installed either as a stand-alone project or as part of shoulder widening (Project 9-H).
18 to 27 (Virgin to Rockville)	• 9-B (rumble strips) • 9-I (turn lane) • 9-M (passing lanes)	The passing-lane project from MP 20.6 to MP 23.5 (Project 9-M) could include rumble strips (Project 9-B, which applies to a long stretch of highway that includes the passing-lane project area) and the turn lane at MP 21 (Project 9-I). The passing-lane project from MP 26.3 to MP 26.7 could also include rumble strips, or rumble strips could be installed at any time. The turn lane at MP 25.8 (Project 9-I) might need to be considered a stand-alone project since there are no other improvements proposed for that general area.
27 to 33.5 (Rockville to Zion Park Entrance)	• 9-C (two-way left-turn lane) • 9-H (shoulder widening) • 9-I (turn lane) • 9-J (culvert extension) • 9-Q (raised markers) • 9-R (barrier removal) • 9-S (bridge rehab/replacement)	This section of SR-9 differs from the rest of the corridor in that it is the gateway to the Zion National Park entrance. Traffic is generally slower, and the highway can become congested during busy weekends and holidays and during summer. The topography limits construction of passing lanes, so improvements focus on making the existing system work better. Shoulder widening (Project 9-H, MP 28.7 to MP 29.2) and a two-way left-turn lane through Springdale (Project 9-C, MP 30 to MP 33) are the highest priority. The culvert extension needed at MP 30.4 (Project 9-J) and the rock wall removal at MP 30 (Project 9-R) could be completed as part of either the shoulder or turn-lane projects. The Springdale Wash bridge (Project 9-S, MP 31.5) is not in immediate need of rehabilitation, but construction of the two-way left-turn lane through Springdale (Project 9-C, MP 30 to MP 33) might require bridge widening as well. Raised markers (Project 9-Q, MP 27 to MP 30.3) are an inexpensive way to help delineate curves and could be installed at any time. If funding for the other higher-priority projects is delayed, UDOT should consider installing these markers in the near future, even though they are not ranked very high on Table 5-1 above, EWCTS Recommended Improvement Projects.

Table 6-1. EWCTS Project Implementation Strategy

Milepost Limits	Coordinating Projects	Description of Activity
SR-17 – La Verkin to I-15		
General Notes: The implementation strategy assumes that the current route of SR-17 will remain in place. If UDOT and Toquerville agree that a bypass will be constructed to a standard that would allow it to become the new route for SR-17 and that the official SR-17 will be transitioned, then the proposed improvement projects for the existing SR-17 might not be constructed or might be scaled back. As part of any Toquerville bypass transition proposal, UDOT should compare the relative cost of making improvements to the existing SR-17 to those of constructing a new highway as well as the potential social and environmental benefits and impacts such a change could have on the area. If allocating funds on the existing SR-17 depends on a decision about the Toquerville bypass, UDOT should move forward with coordination with Toquerville as outlined in the coordination and program projects list (see Table 5-2 above, EWCTS Recommended Coordination Agreements and Programs) before programming funds for extensive improvements to the existing section of SR-17 that would be subject to the reroute. Project 17-L, widening the highway to four lanes, is not included in the implementation strategy because of the uncertainty of the Toquerville bypass.		
0.3 to 2.8 (North La Verkin to South Toquerville)	• 17-B (rumble strips) • 14-C (clear zone widening) • 17-D (two-way left-turn lane) • 17-E (bridge rail transition repair) • 17-F (shoulder widening) • 17-G (improve curve) • 17-H, 17-I (barrier and guardrail improvements) • 17-K (improve curve)	This is the section that transitions from La Verkin to Toquerville. The improvements could be constructed at one time or could be phased. If phased, Projects 17-C and 17-F both address shoulders/clear-zone issues along a stretch from about MP 0.3 to MP 2.2. Rumble strips (Project 17-B) could be installed at the same time. Guardrail and barrier improvements in this section (17-H and 17-I) could be constructed as a stand-alone project or could be worked into the shoulder and clear-zone improvements (17-C, 17-F) Curve and turn-lane improvements between about MP 0.6 and MP 1.2 could be constructed simultaneously. The needed improvement at the La Verkin Creek Bridge could also be completed with the turn lanes and curve improvements since it is within the same section (and there is overlap with the two-way left-turn lane).
3.5 to 5.8 (North Toquerville to I-15)	• 17-B (rumble strips) • 17-F (shoulder widening) • 17-J (passing lanes)	This is the section from the northern end of downtown Toquerville to I-15 and would probably still serve as SR-17 even if the bypass is constructed (the bypass would connect into this section of SR-17). As traffic transitions from low speeds to high speeds (and vice versa), passing lanes and improved shoulders will become increasingly important for safety and traffic flow. This 2.5-mile section of road could be improved in stages, with shoulder and rumble strips together as one project and with the passing lanes as a separate project. Additional traffic lanes might be needed beyond 2035; this should be considered as UDOT plans shoulder improvements.

Table 6-1. EWCTS Project Implementation Strategy

Milepost Limits	Coordinating Projects	Description of Activity
SR-59 – Hildale to Hurricane		
General Notes: SR-59 currently serves mostly as a regional highway with minor amounts of local access for the Apple Valley and Hildale areas. Apple Valley has ambitious plans for the growth that it expects over the next 10 years. This growth will change the nature of SR-59. SR-59 will still provide an important regional highway for southern Utah and northern Arizona but will also become an important local access road for Apple Valley. For this reason, turn-lane projects will be important to local residents and passing lanes will become important for through traffic. Most of the projects included in Table 5-1 above, EWCTS Recommended Improvement Projects can be combined based on location. The following items describe a potential implementation strategy for SR-59 by milepost.		
1.0 to 5.4	• 59-B (rumble strips) • 59-E (passing lanes) • 59-D (two-way left-turn lane)	This section is rural and undeveloped and allows northbound traffic to increase speed after coming out of Hildale. Widen/restripe to accommodate passing and turn lanes. Add rumble strips for the entire length as part of the project.
5.4 to 8.0	• 59-B (rumble strips)	This section has limited access points and will probably stay undeveloped for some time. The rumble strips could be installed at any time (either as a stand-alone project or in coordination with other projects to the north).
8.0 to 18.0 (Apple Valley)	• 59-B (rumble strips) • 59-C (shoulder widening) • 59-D (extend existing two-way left-turn lanes) • 59-E (passing lanes) • 59-F (turn lanes for storage) • 59-G (clear zone widening) • 59-H (edge drop)	This section includes the core of Apple Valley and the approaches to the town on either end; several projects could be coordinated in this section. The section could be broken into two segments: from about MP 8.0 to MP 15.0 (Apple Valley section) and from MP 15.0 to MP 18.0 (Apple Valley to top of Hurricane Cliffs). Additional traffic lanes might be needed beyond 2035; this should be considered as UDOT plans shoulder improvements through this section.
18.0 to 22.0 (Hurricane Cliffs area)	• 59-A (SR-59/SR-9 intersection) • 59-B (rumble strips) • 59-C (shoulder widening) • 59-E (passing lane) • 59-F (turn lanes for storage) • 59-G (clear zone widening) • 59-I (new barrier) • 59-J (guardrail improvement)	This section covers the current SR-59/SR-9 intersection and the surrounding area. Depending on what is ultimately done with the intersection (Project 59-A, either a reroute/reconfiguration or reconstruction of the existing configuration), some or all of these projects could be constructed as part of that project. If the highway is rerouted, some of the projects might still be needed if the existing road remains in place for local access. A northbound passing lane would probably be constructed in either case, since it would still be needed even if the intersection is rerouted/reconfigured. Project 59-A should be studied and fully planned before any of the other projects are constructed in this section.

6.2 Cost Estimates

Table 6-2 provides planning-level cost estimates for 10 projects from the recommended improvement projects list (see Table 5-1 above, EWCTS Recommended Improvement Projects). UDOT selected these projects based on priority and anticipated schedule. Table 6-2 also includes estimates for three Toquerville bypass scenarios. The Toquerville bypass scenarios are based on the lowest cost, highest cost, and "preferred" alternatives identified in the Toquerville Master Plan (Riley Transportation Consultants and Sunrise Engineering 2008). Detailed information for each cost estimate follows the table.

Table 6-2. Planning-Level Cost Estimates for the Eastern Washington County Transportation Study

Project and Overall Rank	Project Description	Planning-Level Cost Estimate
Project 9-C Rank 5 (tie)	Install two-way left-turn lane between the following points: • MP 12.4 to MP 13.0 • MP 17.3 to MP 18.0 • MP 27.47 (through Rockville) • MP 30.0 to MP 33.0 (through Springdale)	$8,840,000
Project 9-D Rank 7 (tie)	Add a second traffic lane to improve intersection of SR-9 and SR-17 from MP 13.0 to MP 12.5.	$770,000
Project 9-I Rank 7 (tie)	Add left turn lanes as follows: • Onto La Verkin overlook, MP 14.9, westbound • To the south for "T" intersection, MP 16.1, westbound • MP 21, westbound • MP 25.8, westbound	$1,300,000
Project 9-O Rank 3	Improve intersection of SR-9 and Kolob Reservoir Road at MP 18.7.	$650,000
Project 17-D Rank 5 (tie)	Add two-way left-turn lanes (permissive) between the following points: • MP 0.6 to MP 0.9 (begin flare at north end of La Verkin Creek Bridge) • MP 1.5 to MP 2.0 • MP 2.8 to MP 3.4 (through Toquerville)	$1,380,000
Project 17-G Rank 8	Improve curve safety by adding left-turn storage at MP 1.2 in the southbound direction.	$170,000
Project 17-J Rank 10	Construct passing lanes between MP 4.3 and MP 4.9 in both directions.	$1,730,000
Project 59-A Rank 1	Improve the existing SR-59 approach to Hurricane by adding a second travel lane in each direction.	$2,340,000

Table 6-2. Planning-Level Cost Estimates for the Eastern Washington County Transportation Study

Project and Overall Rank	Project Description	Planning-Level Cost Estimate
Project 59-D Rank 4	Construct two-way left-turn lanes in the following locations: • Extend existing MP 0.64 to MP 0.27, southbound • MP 4.5 to MP 5.4 • Extend existing MP 9.8 to MP 10.1 • Extend existing MP 10.5 to MP 10.7	$2,950,000
Project 59-F Rank 2	Construct right- and left-turn lanes (for storage) at the following locations: • Left-turn storage, MP 8.1 (Apple Valley Main Street), both directions • Right-turn storage, MP 11.9, both directions • Left-turn storage, MP 14.6 (Kokopelli Golf Course), northbound • Left-turn storage, MP 21.2, southbound • Add left-turn lanes to improve intersection, MP 22.02 (100 South and 100 East in Hurricane), both directions • Add left-turn lanes to improve intersection, MP 22.05 (Main Street and 100 South in Hurricane), both directions	$1,840,000
Bypass Preferred	The Water Conservancy Road alignment. Ties into I-15 frontage road. South of Anderson Junction heads east and ties into SR-17 near Old Church Road.	$34,910,000
Bypass 1A[b]	One option of the Grassy Lane alignment. Splits from existing SR-17 1 mile south of I-15 and ties into existing SR-17 at Grassy Lane.	$23,410,000
Bypass 3A[b]	One option of the La Verkin alignment. Splits from existing SR-17 1 mile south of I-15 and ties into the Southern Corridor in La Verkin. This alignment does not tie into the existing SR-17 corridor south of Toquerville.	$50,180,000

[a] The cost estimate is for one option that would improve the existing alignment of SR-59 as it enters Hurricane. The study described in Project 59-A would fully address other options, such as new connections or other improvements to the existing intersection of SR-59 and SR-9.

[b] Because the Toquerville bypass options were not included in Table 5-1 above, EWCTS Recommended Improvement Projects, they do not have an overall rank.

Table 6-3. Project 9-C: Install Two-Way Left-Turn Lanes on SR-9

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 9-C				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	1330	*$18,000.00*
Granular Borrow	Ton	$28.00	30062	*$842,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	33487	*$503,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	14310	*$158,000.00*
Remove Concrete Sidewalk	sq yd	$9.00	8824	*$80,000.00*
Untreated Base Course	Ton	$20.00	20795	*$416,000.00*
HMA - 3/4 inch	Ton	$125.00	11454	*$1,432,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	14310	*$330,000.00*
Concrete Sidewalk	sq ft	$5.00	79416	*$398,000.00*
			SUBTOTAL	$4,177,000
Mobilization	15%			*$630,000.00*
Traffic Control	7%			*$293,000.00*
Surveying (Construction)	3%			*$126,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$1,570,000.00*
			SUBTOTAL	$6,796,000
Preliminary/Final Engineering	10%		1	*$680,000.00*
			SUBTOTAL	$7,476,000
Construction Engineering	10%			*$ 680,000.00*
UDOT Contingency	10%			*$ 680,000.00*
			TOTAL	**$8,836,000**
			ROUNDED TOTAL	***$8,840,000***

Italics denote rounding

Table 6-4. Project 9-D: Add Second Traffic Lane To Improve Intersection of SR-9 and SR-17

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 9-D				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	880	*$12,000.00*
Granular Borrow	Ton	$28.00	3160	*$89,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	3520	*$53,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	2186	*$44,000.00*
HMA - 3/4 inch	Ton	$125.00	1204	*$151,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$349,000
Mobilization	15%			*$60,000.00*
Traffic Control	7%			*$25,000.00*
Surveying (Construction)	3%			*$11,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$140,000.00*
			SUBTOTAL	$585,000
Preliminary/Final Engineering	10%		1	*$59,000.00*
			SUBTOTAL	$644,000
Construction Engineering	10%			*$ 59,000.00*
UDOT Contingency	10%			*$ 59,000.00*
			TOTAL	**$762,000**
			ROUNDED TOTAL	***$770,000***

Italics denote rounding

Table 6-5. Project 9-I: Add Left-Turn Lanes on SR-9

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 9-I				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	1520	*$20,000.00*
Granular Borrow	Ton	$28.00	5460	*$153,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	6080	*$92,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	3776	*$76,000.00*
HMA - 3/4 inch	Ton	$125.00	2080	*$260,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$601,000
Mobilization	15%			*$100,000.00*
Traffic Control	7%			*$43,000.00*
Surveying (Construction)	3%			*$19,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$230,000.00*
			SUBTOTAL	$993,000
Preliminary/Final Engineering	10%		1	*$100,000.00*
			SUBTOTAL	$1,093,000
Construction Engineering	10%			*$ 100,000.00*
UDOT Contingency	10%			*$ 100,000.00*
			TOTAL	**$1,293,000**
			ROUNDED TOTAL	***$1,300,000***

Italics denote rounding

Table 6-6. Project 9-O: Improve Intersection of SR-9 and Kolob Reservoir Road

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 9-O				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	*$0.00*
Granular Borrow	Ton	$28.00	2730	*$77,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	3040	*$46,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	1888	*$38,000.00*
HMA - 3/4 inch	Ton	$125.00	1040	*$130,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$291,000
Mobilization	15%			*$50,000.00*
Traffic Control	7%			*$21,000.00*
Surveying (Construction)	3%			*$9,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$120,000.00*
			SUBTOTAL	$491,000
Preliminary/Final Engineering	10%		1	*$50,000.00*
			SUBTOTAL	$541,000
Construction Engineering	10%			*$ 50,000.00*
UDOT Contingency	10%			*$ 50,000.00*
			TOTAL	**$641,000**
			ROUNDED TOTAL	***$650,000***

Italics denote rounding

Table 6-7. Project 17-D: Add Two-Way Left-Turn Lanes on SR-17

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 17-D				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	1027	*$14,000.00*
Granular Borrow	Ton	$28.00	5899	*$166,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	6571	*$99,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	4080	*$82,000.00*
HMA - 3/4 inch	Ton	$125.00	2248	*$281,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$642,000
Mobilization	15%			*$100,000.00*
Traffic Control	7%			*$45,000.00*
Surveying (Construction)	3%			*$20,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$250,000.00*
			SUBTOTAL	$1,057,000
Preliminary/Final Engineering	10%		1	*$106,000.00*
			SUBTOTAL	$1,163,000
Construction Engineering	10%			*$ 106,000.00*
UDOT Contingency	10%			*$ 106,000.00*
			TOTAL	**$1,375,000**
			ROUNDED TOTAL	***$1,380,000***

Italics denote rounding

Table 6-8. Project 17-G: Improve Curve Safety at MP 1.2 on SR-17

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 17-G				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	*$0.00*
Granular Borrow	Ton	$28.00	634	*$18,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	707	*$11,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	439	*$9,000.00*
HMA - 3/4 inch	Ton	$125.00	242	*$31,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$69,000
Mobilization	15%			*$20,000.00*
Traffic Control	7%			*$5,000.00*
Surveying (Construction)	3%			*$3,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$30,000.00*
			SUBTOTAL	$127,000
Preliminary/Final Engineering	10%		1	*$13,000.00*
			SUBTOTAL	$140,000
Construction Engineering	10%			*$ 13,000.00*
UDOT Contingency	10%			*$ 13,000.00*
			TOTAL	**$166,000**
			ROUNDED TOTAL	***$170,000***

Italics denote rounding

Table 6-9. Project 17-J: Construct Passing Lanes on SR-17

Utah Department of Transportation Eastern Washington County Transportation Study Cost Estimate - Project 17- J				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	*$0.00*
Granular Borrow	Ton	$28.00	7584	*$213,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	8448	*$127,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	5246	*$105,000.00*
HMA - 3/4 inch	Ton	$125.00	2889	*$362,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$807,000
Mobilization	15%			*$130,000.00*
Traffic Control	7%			*$57,000.00*
Surveying (Construction)	3%			*$25,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$310,000.00*
			SUBTOTAL	$1,329,000
Preliminary/Final Engineering	10%		1	*$133,000.00*
			SUBTOTAL	$1,462,000
Construction Engineering	10%			*$ 133,000.00*
UDOT Contingency	10%			*$ 133,000.00*
			TOTAL	**$1,728,000**
			ROUNDED TOTAL	***$1,730,000***

Italics denote rounding

Table 6-10. Project 59-A: Improve Intersection of SR-59 and SR-9 in Hurricane

Utah Department of Transportation Eastern Washington County Transportation Study Cost Estimate - Project 59-A				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	7744	*$101,000.00*
Granular Borrow	Ton	$28.00	6952	*$195,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	7744	*$117,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	3600	*$40,000.00*
Remove Concrete Sidewalk	sq yd	$9.00	2000	*$18,000.00*
Remove Guardrail	ft	$3.00	950	*$3,000.00*
Untreated Base Course	Ton	$20.00	4809	*$97,000.00*
HMA - 3/4 inch	Ton	$125.00	2648	*$331,000.00*
W-Beam Guardrail 72 inch Wood Post	ft	$20.00	950	*$19,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	3600	*$83,000.00*
Concrete Sidewalk	sq ft	$5.00	18000	*$90,000.00*
			SUBTOTAL	$1,094,000
Mobilization	15%			*$170,000.00*
Traffic Control	7%			*$77,000.00*
Surveying (Construction)	3%			*$33,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$420,000.00*
			SUBTOTAL	$1,794,000
Preliminary/Final Engineering	10%		1	*$180,000.00*
			SUBTOTAL	$1,974,000
Construction Engineering	10%			*$ 180,000.00*
UDOT Contingency	10%			*$ 180,000.00*
			TOTAL	**$2,334,000**
			ROUNDED TOTAL	***$2,340,000***

Italics denote rounding

Table 6-11. Project 59-D: Construct Two-Way Left Turn Lanes on SR-59

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 59-D				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	*$0.00*
Granular Borrow	Ton	$28.00	13052	*$366,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	14539	*$219,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	9028	*$181,000.00*
HMA - 3/4 inch	Ton	$125.00	4973	*$622,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$1,388,000
Mobilization	15%			*$210,000.00*
Traffic Control	7%			*$98,000.00*
Surveying (Construction)	3%			*$42,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$530,000.00*
			SUBTOTAL	$2,268,000
Preliminary/Final Engineering	10%		1	*$227,000.00*
			SUBTOTAL	$2,495,000
Construction Engineering	10%			*$ 227,000.00*
UDOT Contingency	10%			*$ 227,000.00*
			TOTAL	**$2,949,000**
			ROUNDED TOTAL	***$2,950,000***

Italics denote rounding

Table 6-12. Project 59-F: Construct Right- and Left-Turn Lanes on SR-59

Utah Department of Transportation Eastern Washington County Transportation Study				
Cost Estimate - Project 59-F				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	*$0.00*
Granular Borrow	Ton	$28.00	8090	*$227,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	9009	*$136,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	5594	*$112,000.00*
HMA - 3/4 inch	Ton	$125.00	3082	*$386,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$861,000
Mobilization	15%			*$130,000.00*
Traffic Control	7%			*$61,000.00*
Surveying (Construction)	3%			*$26,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$330,000.00*
			SUBTOTAL	$1,408,000
Preliminary/Final Engineering	10%		1	*$141,000.00*
			SUBTOTAL	$1,549,000
Construction Engineering	10%			*$ 141,000.00*
UDOT Contingency	10%			*$ 141,000.00*
			TOTAL	**$1,831,000**
			ROUNDED TOTAL	***$1,840,000***

Italics denote rounding

Table 6-13. Toquerville Bypass Preferred Alignment

Utah Department of Transportation Eastern Washington County Transportation Study Cost Estimate - Toquerville Bypass Preferred Alignment				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	$0.00
Granular Borrow	Ton	$20.00	146,900	$2,938,000.00
Roadway Excavation (Plan Quantity)	yd3	$10.00	0	$0.00
Remove Concrete Curb and Gutter	ft	$6.00	0	$0.00
Remove Concrete Sidewalk	sq yd	$9.00	0	$0.00
Untreated Base Course	Ton	$30.00	61,400	$1,842,000.00
HMA - 3/4 inch	Ton	$150.00	65,600	$9,840,000.00
Concrete Curb and Gutter Type B1	ft	$23.00	35,800	$823,400.00
Concrete Sidewalk	sq ft	$5.00	214,800	$1,074,000.00
			SUBTOTAL	$16,517,400
Mobilization	15%			$2,480,000.00
Traffic Control	7%			$1,157,000.00
Surveying (Construction)	3%			$496,000.00
Right of Way ($50/ft^2 Assumption)	sq ft	$20.00	0	$0.00
Contingency (Items not accounted for)	30%			$6,200,000.00
			SUBTOTAL	$26,850,400
Preliminary/Final Engineering	10%		1	$2,686,000.00
			SUBTOTAL	$29,536,400
Construction Engineering	10%			$ 2,686,000.00
UDOT Contingency	10%			$ 2,686,000.00
			TOTAL	**$34,910,000**

Table 6-14. Toquerville Bypass Option 1A: Grassy Lane Alignment

Utah Department of Transportation Eastern Washington County Transportation Study Cost Estimate - Project Toquerville Bypass Alt 1A				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	*$0.00*
Granular Borrow	Ton	$28.00	104229	*$2,919,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	116100	*$1,742,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	72098	*$1,442,000.00*
HMA - 3/4 inch	Ton	$125.00	39706	*$4,964,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$11,067,000
Mobilization	15%			*$1,670,000.00*
Traffic Control	7%			*$775,000.00*
Surveying (Construction)	3%			*$333,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$4,160,000.00*
			SUBTOTAL	$18,005,000
Preliminary/Final Engineering	10%		1	*$1,801,000.00*
			SUBTOTAL	$19,806,000
Construction Engineering	10%			*$ 1,801,000.00*
UDOT Contingency	10%			*$ 1,801,000.00*
			TOTAL	**$23,408,000**
			ROUNDED TOTAL	***$23,410,000***

Italics denote rounding

Table 6-15. Toquerville Bypass Option 3A: La Verkin Alignment

Utah Department of Transportation Eastern Washington County Transportation Study Cost Estimate - Project Toquerville Bypass Alt 3A				
Items	**UNIT**	**UNIT COST**	**QUANTITY**	**AMOUNT**
Borrow (Plan Quantity)	sq yd	$13.00	0	*$0.00*
Granular Borrow	Ton	$28.00	223591	*$6,261,000.00*
Roadway Excavation (Plan Quantity)	yd3	$15.00	249057	*$3,736,000.00*
Remove Concrete Curb and Gutter	ft	$11.00	0	*$0.00*
Remove Concrete Sidewalk	sq yd	$9.00	0	*$0.00*
Untreated Base Course	Ton	$20.00	154664	*$3,094,000.00*
HMA - 3/4 inch	Ton	$125.00	85178	*$10,648,000.00*
Concrete Curb and Gutter Type B1	ft	$23.00	0	*$0.00*
Concrete Sidewalk	sq ft	$5.00	0	*$0.00*
			SUBTOTAL	$23,739,000
Mobilization	15%			*$3,570,000.00*
Traffic Control	7%			*$1,662,000.00*
Surveying (Construction)	3%			*$713,000.00*
Right of Way ($50/ft^2 Assumption)	sq ft	$50.00	0	*$0.00*
Contingency (Items not accounted for)	30%			*$8,910,000.00*
			SUBTOTAL	$38,594,000
Preliminary/Final Engineering	10%		1	*$3,860,000.00*
			SUBTOTAL	$42,454,000
Construction Engineering	10%			*$ 3,860,000.00*
UDOT Contingency	10%			*$ 3,860,000.00*
			TOTAL	**$50,174,000**
			ROUNDED TOTAL	***$50,180,000***

Italics denote rounding

7.0 References

[AGRC] Utah Automated Geographic Reference Center

2008 SGID.U024, Utah Land Ownership. ftp.agrc.state.ut.us/SGID_Vector/MetadataHTML/SGID_U024_LandOwnership.html. Downloaded July 3, 2008.

Alpha Engineering Company

2008 Road Plan, Apple Valley, Utah. February.

City of La Verkin

No date General plan land-use map.

[EPA] U.S. Environmental Protection Agency

2008 List of impaired waters for watershed 15010008. iaspub.epa.gov/tmdl/waters_listcontrol?state=UT&huc=15010008&p_cycle=2004. Downloaded February 4, 2008.

[FCAOG] Five County Association of Governments

2008 Washington County Critical Lands Resource Guide. Draft.

Giraud, Richard E., and Lucas M. Shaw

2007 Landslide Susceptibility Map of Utah, Map 228 DM. Produced for the Utah Geological Society.

Governor's Office of Planning and Budget

2008a 2008 Population by Area and Component. January.

2008b 2008 Baseline City Population Projections. May.

2008c 2008 Employment by Area and Industry. March.

[HDR] HDR Engineering, Inc.

2007 Memo to file from Rick Black regarding natural resources along the study corridors. November 5.

2008 Eastern Washington County Transportation Study Stakeholder Interviews/Meetings. May 27 and 28, 2008.

Hintze, Lehi F.

1974 Geological Map of Utah. Modified by Grant C. Willis in 2005. Prepared for the Utah Geological Survey.

Horrocks Engineers

2007 Eastern Hurricane existing conditions technical memorandum. November 28.

2008 Corridor Safety Assessment, SR-9/SR-17/SR-59. April 30.

National Park Service

2008 Detailed listed of Land and Water Conservation Fund grants. waso-lwcf.ncrc.nps.gov/public/. Accessed February 4, 2008.

Natural Resources Conservation Service
2007 Web Soil Survey 2.0. websoilsurvey.nrcs.usda.gov/app/. Accessed November 9, 2007.

Riley Transportation Consultants and Sunrise Engineering
2008 Toquerville City Transportation Master Plan. January 7.

Stokes, William Lee
1986 Geology of Utah. Prepared for the Utah Museum of Natural History, University of Utah and Utah Geological and Mineral Survey Department of Natural Resources.

Toquerville City
2006 Toquerville, Utah zoning map. January.

Town of Springdale
2005 Springdale General Plan. Adopted December 14.
2007 Zoning map.

[TRB] Transportation Research Board
2000 Highway Capacity Manual 2000.

U.S. Census Bureau
2005 2005 American Community Survey.
2006 2006 American Community Survey.
2008 County population, population change and estimated components of population change: April 1, 2000 to July 1, 2007 (CO-EST2007). Released March 10.

[UDOT] Utah Department of Transportation
No date Zion Canyon Trail Feasibility Study.
2001 Pavement Range Table, UDOT Detail Data Sheets.
2004a Utah Bicycle Suitability Map.
2004b Hurricane City Transportation Master Plan. October.
2005 La Verkin City Community Transportation Plan. October.
2006a Utah Department of Transportation State Highway Access Category Inventory. May.
2006b Town of Springdale Community Transportation Plan. October 10 and 11.
2007a Wildlife Connectivity across Utah's Highways Updated, compiled by Paul W. West, Wildlife Biologist. October 17.
2007b Skid data summary. February.
2007c Rut depths on Utah Highways. February.
2007d UDOT Long-Range Transportation Plan 2007–2030. June.
2008a 2007 ride condition historical ride index using half-car IRI. January.
2008b Structure condition reports for SR-9, SR-17, and SR-59. Provided by Justin Jar.
2008c Statewide Transportation Improvement Program 2008–2013.

[UDOT and FHWA] Utah Department of Transportation and Federal Highway Administration

2003 Southern Corridor Draft Environmental Impact Statement and Section 4(f) Evaluation. Project FHWA-UT-EIS-03-01-D. March.

[UGS] Utah Geological Survey

2004 UGS Earthquake Fault Map of a portion of Washington County, Utah.

Utah Community Planners

2005 La Verkin City General Plan. Adopted December 21.

Appendix A. Summary of Stakeholder and Agency Interviews

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
Southwest Utah Bicycle Touring Association	Dennis Wingnall (telephone)	January 17, 2008	• Construction projects need to follow UDOT's policy and guidelines for bicycle lanes. The established UDOT policy will suit the needs of bicycle users as long as it is implemented.
Zion National Park	Kezia Neilson (telephone)	January 17, 2008	• Listed fish species in the Virgin River will need special consideration during planning for projects that could affect the river. • BLM and the City of St. George have identified the section of SR-9 from the "Twist" at the top of the hill near La Verkin all the way to Zion National Park as a scenic corridor. BLM is being proactive to protect views on all BLM-administered land on this section of highway and to not encroach on any scenic views for the drive into the park • The road has a purposefully slower traffic speed as it approaches the park to prepare park users for the slower pace once they enter the park; this pattern of speed reduction needs to be maintained. • Any modification to the historic ditches in Rockville would require coordination with the Utah State Historic Preservation Office (SHPO). • The historic town of Grafton can be seen from the highway near Rockville. • There are some very old mulberry trees in Rockville that are important to the community and character of the town. • Need to coordinate with the City of Springdale regarding its bicycle and pedestrian planning efforts.

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
Zion National Park	• Kristin Legg, Resource Mgt. and Research • Christine Kennedy, Fees • Tom Haraden, Interpretation • Ray O'Neil, Backcountry • Sheila Forester, Fee Supervision • Kezia Nielsen, Env. Compliance • Jack Burns, Concessions/Shuttle • Don Sharlow, Roads and Trails • Frank Austin, PTI (shuttle)	February 5, 2008	• Springdale citizens want a bicycle- and pedestrian-friendly community with bikeways, sidewalks, and slower traffic. • Park wants traffic to be slow through Rockville and Springdale. • Need road maintenance through town because of coach buses and high tourist use. • Realign some intersections, especially at cemetery. • UDOT should improve tunnel shuttle information area. • Curve at Rancho Bar (1 mile east of Virgin) is dangerous. • Junction 101 and SR-9, parallel intersection and hard to see. • Rockville and Springdale have historic stone-lined ditches that they want protected. • Parking for shuttle system is a challenge that will persist in the future as the system expands. • Protect visual resources and scenic values of the corridor (control all-terrain vehicle [ATV] use, follow recommendations of area plans, avoid excessive lighting). • North Creek Bridge and Coal Pits Bridge need to be improved. • Slide areas just outside park entrance need attention. • Drainage needs improvement to prevent ice buildup along road edges in winter. • UDOT storage area at Coal Pits Bridge needs to be cleaned up or moved (unsightly). • Safer pullouts needed.
Hurricane City	• Arthur LeBaron • Clark Fawcett	February 4, 2008	• 4,500 acres going into development around MP 22 to MP 18 on SR-59; need to plan for population increase and traffic issues. • MP 19 on SR-59 (Sheep Bridge Rd.) could be improved to provide a connection to SR-9; would relieve traffic flow. • Need corridor preservation to accommodate traffic for new developments. Could connect Southern Corridor roads (when final alignment is chosen) to SR-59.

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
Springdale	• Tom Dansie	February 4, 2008	• Third or passing lane to Zion National Park needed. • Rockville speed limit is currently 40 mph (miles per hour); needs to be lowered to 30 mph. • Public transportation needed from McCarren or St. George to Springdale to accommodate tourists. • Improve shoulder or add bicycle lane to improve conditions for cyclists. • Springdale town plan has a pedestrian/bicycle trail planned from MP 31 to MP 28 into Rockville. Waiting for funding but want to make sure road improvements are compatible.

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
UDOT Planning and Programming	• Dan Kuhn, Freight Planner • Walt Steinvorth, Transportation Planner	April 3, 2008	*General* • Washington County is a very central location for freight/ distribution; it is one day's travel time to California, Phoenix, and Salt Lake City. Companies can adjust schedules to travel through the major metropolitan areas in off-peak times to avoid congestion. • Passing/climbing lanes need to be frequent enough and long enough to do some real good. • Shoulders and/or pullouts would be very helpful on all routes. *SR-9* • Local delivery trucking to provide goods and services is the main trucking issue. • Tour buses and RVs are the primary heavy vehicles. Some of these larger rigs have similar operating and safety concerns as trucks. • No shoulders or soft shoulders in some areas apply to tour buses and RVs as well as to trucks. • Road could benefit from paved shoulders, pullouts, and climbing lanes. *SR-17* • Local delivery and main route to Cedar City. *SR-59* • Major truck route. • Truck traffic will continue to increase on this route as a main freight-movement route for the foreseeable future. • Challenges with steep hills; these areas could benefit from climbing and passing lanes. Downhill passing lanes on steep grades are just as important as uphill climbing/passing lanes. • Shoulders and pullouts are needed. • Intersections need longer turn pockets, longer signal timing, and larger turn radii to improve truck operations and safety.

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
Southern Utah Trucking Association (SUTA)	• Stacey Betteridge, President • SUTA members in audience	April 15, 2008	• SR-9/I-15 interchange needs improvement. • SR-17 from La Verkin Creek through Toquerville has steep grades, sharp curves, and poor sight distances. • Need new/improved connection of SR-9 and SR-59. • Centerline and shoulder rumble strips are needed.
Dixie MPO	• Curt Hutchings	May 27, 2008	• Planned development in Apple Valley will lead to increased traffic on SR-59. • Intersection of Kolob Road and SR-9 in Virgin is dangerous. • Increased traffic on SR-9 from development at resort at east end of Virgin will affect road operation. • Future modifications likely needed at intersection of SR-17 and SR-9. • Access management is an issue along all corridors. • Increased traffic on SR-9 and SR-17 from development in western Hurricane.
Washington County	• Deon Goheen	May 27, 2008	• More vehicles will use SR-17 in the future to avoid the congested section of SR-9 between Hurricane and I-15. • Need to extend public transportation from Zion National Park to Hurricane or St. George. • Intersection at Kolob Road and SR-9 is dangerous. • Need to have a connection to SR-59 from the Southern Corridor. • Too many stops in Hurricane and La Verkin cause congestion. • Access management is an issue on all corridors. • SR-59 needs turn lanes. • Future development in Apple Valley will increase traffic on SR-59.

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
Bureau of Land Management	• Kathy Abbott, Real Estate Specialist • Dave Kiel, Outdoor Recreation Planner • Lynne Scott, Landscape Architect • Dawna Feroni Rowley, Asst. Field Office Manager • Russell Schreiner, Geologist • Geralyn McEwen, Archaeologist • Bob Douglas, Wildlife Biologist • Dave Corry, Natural Resource Specialist	May 27, 2008	• Need to maintain safe access to BLM recreation areas on SR-59 and SR-9. • Work along the Virgin River (SR-9) will need to carefully consider listed fish species. • There are sensitive plant and wildlife species along SR-59. • Any construction will need to address erosion control and prevent sediment from entering waterways, especially the Virgin River. • There are sensitive cultural resources in the Hurricane Cliffs area. • Sheep Bridge Road, if developed, could be used as utility corridor.
Rockville Town	• Dan McGuire, Mayor • Shirley Ballard, Planning Commissioner	May 28, 2008	• Speed too fast through town. • Maintenance of shoulders and ditches is currently inadequate. Debris on shoulders is a safety hazard to pedestrians and cyclists. • UDOT needs to provide a bicycle lane or bicycle trail between Rockville and Springdale. • Rockville Bridge (south of SR-9) needs improvement. • Do not widen or add a center turn lane to SR-9 through town.

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
La Verkin City	• Derek Imlay, Director of Operations • June Jeffery, Deputy Recorder • Doug Gubler, Public Works Director • Lloyd Watkins, Chef of Police	May 28, 2008	• Virgin River Bridge needs pedestrian walkway on west side. • Existing sidewalks need to be moved away from road. Sidewalks needs to be extended from where they currently end on SR-17 and on SR-9 west of the SR-17/SR-9 intersection to the city limits. • Pah Tempe Bridge needs to be rehabilitated so that it can be used as an alternate river crossing in emergencies. • Extend turn lane from intersection of SR-17 and SR-9 east on SR-9 to allow safer turning movements onto side streets. • Stoplight at intersection of SR-17 and SR-9 needs solar or other power backup. • Traffic-calming and pedestrian safety improvements needed through core of La Verkin. • Protective fencing on pedestrian bridges needs improvement.
Apple Valley	• Rick Moser, Planning Chair • Justin Eves, Town Council • Jim Palevlis, developer • Dale Beddo, developer (Kokopelli Golf Course) • Lee Steadman, developer (Next Entertainment) • Mac Adamson, developer (Next Entertainment)	May 28, 2008	• New and planned developments need safe access (turn lanes, intersections) along SR-59. • Turn lanes, acceleration/deceleration lanes needed along SR-59. Turn lanes especially needed between Apple Valley Drive/SR-59 on the north and Main Street/SR-59 on the south. • Passing lanes needed along length of SR-59. • Need lower speed limit through town. • City would like to see four lanes with center turn lane by 2035. • Improvements to SR-59 though Hurricane Cliffs desperately needed.

Table A-1. Summary of Stakeholder and Agency Interviews

Stakeholder/Agency Name	Representative(s)	Meeting Date	Summary of Comments and Concerns
Zion Canyon Corridor Committee	• Committee Board Members	June 18, 2008	• Would like to have parallel bicycle trails along and/or on SR-9. • There are deep irrigation ditches along the highway through some of the towns on SR-9 that should be removed to increase safety. • Add passing lanes between towns rather than widening SR-9 through the towns (except at major intersections for turn lanes). • The towns along SR-9 would like to work with UDOT to develop individual access-management plans for each town. • Virgin has been examining the possibility of relocating the Kolob access road to line up with the Rio de Zion intersection as a way to improve this unsafe intersection. • Construct pull-offs/pull-outs at historic monument sites along SR-9. Would also like to implement more historic monument locations in the future. • Construct pull-offs/pull-outs at existing and future trailheads along SR-9. • Evaluate key intersections in communities along SR-9 for turn lanes. • Future expected expansion of the Zion shuttle system might require new parking areas along the corridor with bus turn-outs, etc. • Committee is concerned that standard approach to protect the clear zone with concrete Jersey barriers conflicts with the scenic beauty of the corridor. Would like to see other safety treatments that are more aesthetic.

Appendix B. Summary of Public Comments

Table B-1. Summary of Public Comments from the February 4, 2008, St. George Transportation Expo

Subject	Comment
Road Widening/Passing Lanes	
	• No need to widen SR-9 from La Verkin to Zion National Park. A bicycle path on both sides of SR-9 would be wonderful. • Need the entire route of SR-59 increased to four lanes with acceleration lanes to accommodate the 12,000 people in Hildale. • MP 22 on SR-59 in Hurricane needs to be widened/improved for truck use. • SR-17 in Toquerville; need to widen to four-lane road near new Trails development. • Widen SR-17 to four lanes from about MP 3.5 to I-15. • SR-9 needs passing lanes and school bus pull-outs. • Passing lanes needed along entire length of SR-17. • Third or passing lane needed SR-9 to Zion. • Sight distance along SR-9 on passing lanes is a problem. Need more and improved passing lanes.
Intersections	
	• MP 19 of SR-59: need grade-separated road to access Sheep Bridge Road. Need road at MP 21 of SR-59 to 600 North to get off hill. • Where SR-9 meets SR-17, dangerous hill; need warnings for tourists. Warn about speed and slope.
Growth and Development	
	• Roads need to accommodate new developments such as Calina Tinta in Hurricane and Dixie Springs near Sand Hollow. • New development going in west of SR-59 at about MP 19; access issues. • Development going in along SR-59 around MP 14; access issues.
Safety	
	• The Dugway (MP 22 to MP 19 on SR-59) is dangerous. • SR-9 to Zion, speed limit is too slow. • No trucks should be allowed on 600 North. • Because of lack of turning lanes on SR-9, school buses can't make left turns, so kids are asked to ride to Springdale and back (an extra hour). Add walking and biking trail parallel to the highway. • Highway traffic travels too fast on SR-59; put police force out there. • Virgin would love to work with UDOT to have the highway corridor through town designed to slow traffic down. • SR-59, MP 21 runaway truck lane needs improvement (currently gravel and not very good). • SR-9 throughout on curves, but especially near MP 14, needs guard rails. • Do not increase speed limits through Virgin. • SR-9 needs bicycle lanes.

Table B-1. Summary of Public Comments from the February 4, 2008, St. George Transportation Expo

Subject	Comment
	• Need passing lanes along SR-59; sight distance along road is bad, road dips and has many curves. • SR-59, bike/car conflict, need bike lane or shoulder MP 12-22. • SR-9, downhill travel speed should be reduced at MP 14. • Reduce speed limit through Rockville. • SR-9 and Kolob Reservoir Road intersection is dangerous and needs to be relocated or improved.
Regional Connectors	
	• Need alternate road south of Hurricane and going east around the mountain up to SR-59 (at Apple Valley or Hildale) because current road is steep, crooked, and narrow. • SR-59 south of Hurricane, keep road out of Hurricane and tie into Southern Corridor. • Preserve corridor for connection between SR-59 and Southern Corridor. • Toquerville Bypass road needed. • Within Hurricane, reroute traffic (100 West) to access SR-59. • Cross connector road needed to get from SR-17 to Leeds.
Recreation	
	• Need shuttle service from St. George airport to Springdale to accommodate tourism and decrease number of cars on road. • Hard to park to start the GEM Trail in Hurricane (MP 19 to MP 18, SR-59). Gooseberry Mesa access should be improved in Apple Valley (MP 8, SR-59). Gooseberry Mesa turnoff needs sign. • Trails should stay near highway and not take private property.
Other	
	• Work with Virgin to implement streetscape plan (landscaping, islands, parking, shuttle stops, etc.). • Virgin Town seeks to create and maintain a walkable rural community; UDOT planning should incorporate this into its plans (sidewalks, links to ATV and equestrian paths, etc.). • Minimize lighting along SR-9 to preserve night sky views.

Table B-2. Summary of Public Comments from the May 28, 2008, Open House

Subject	Comment
Road Widening/Passing Lanes	
	• Create bike/pedestrian paths, not turn lanes in Springdale and Rockville. • No turn lanes in Rockville and Springdale. • Do not widen SR-17 through Toquerville. • Need turning lane on north side of La Verkin Creek Bridge. • Add passing lanes between top of hill in La Verkin and Virgin (SR-9). • Widen SR-9 between La Verkin and Virgin to four lanes. • Need turn lanes at about MP 8 on SR-59.
Intersections	
	• Improve Bridge Road intersection on SR-9 at about MP 28. • Anasazi Way intersection on SR-9 (MP 29) in dangerous. Need convex mirror at a minimum. • Intersection of SR-59 and SR-9 needs to be rerouted.
Growth and Development	
	• The Town of Springdale would like to work with UDOT in establishing standards/guidelines to gauge what future improvements to SR-9 through Springdale may be necessary with new development. This would help UDOT, the Town, and developers know what to expect on SR-9 as new development goes in. • Access to future (planned) developments along SR-9 and SR-17 will need to be accommodated.
Safety	
	• All three highways need center and shoulder rumble strips. • Need to widen roads and plan actual bicycle lanes. Southern Utah is a cycling destination for cyclists from all over the world. Let's make it safe and inviting. • Bike lanes needed on SR-9 between La Verkin and Springdale. • SR-9, MP 28 through MP 32: need continuous sidewalk for pedestrian safety, bike lanes, and traffic calming. • Provide bicycle lanes on SR-17 and SR-59. • SR-17: State Street through La Verkin Bridge at La Verkin Creek (MP 0.7): need turn lane on north side of bridge for improved access. Widen curve at MP 1.0 to MP 1.2 and put up guardrail, lower speed limit. Asphalt on south side of bridge has settled and results in noise from trucks hitting the bump caused by the settling. • On SR-17, take out turn lane and put in cement center/side street parking and turns at intersections only. • Numerous blind driveways, curves, and intersections along SR-17 need to be improved. • Prohibit passing between about MP 1.5 and MP 2.0 on SR-17. • Reduce speed through Toquerville. • Add traffic calming to SR-17 through Toquerville. • Need improved access for "paw" gates, Ray Porter, and apartments on SR-17. • Kolob Reservoir Road intersection on SR-9 is dangerous and needs improvement. • La Verkin: 500 North (SR-9) and Main Street difficult to cross on foot. • Reduce speed through Rockville and Springdale for pedestrian safety. Add pedestrian crossing warning lights. • Intersection of SR-9 and SR-59 in Hurricane is dangerous; improve curve.

Table B-2. Summary of Public Comments from the May 28, 2008, Open House

Subject	Comment
	• Reduce speed to 55 mph on SR-9 between top of "Twist" and Virgin and add passing lanes to alleviate conflicts with slow-moving vehicles.
Regional Connectors	
	• Toquerville needs a bypass road to the west of town. It should cut through the "hogsback" south of the city cemetery, *not* Grassy Lane. This state highway could be connected to the north end of Hurricane eventually. • Toquerville Bypass needed; this could be a new SR-17. • Prefer SR-17 be diverted thru hogsback below [south of] cemetery, the return to SR-17 just south of I-15 exit 2. • There needs to be a road from west side of Hurricane across the Virgin up through area south of Leeds to I-15 just west of Toquerville. • Bypass road for Toquerville on west side with connections to I-15 frontage road along water conservancy pipeline from cotton well with access to proposed small reservoir just south of Hurricane (I-15). • Extend Southern Corridor from Kanab, Utah to Fredonia, Arizona. Create bypass to SR-59. • Rename SR-59 (Utah)/SR 389 (Arizona) so that there is only one number all the way to Lake Powell (make it a U.S. route). • Do not improve Sheep Bridge Road as a truck route connecting SR-9 and SR-59; does not consider existing residents. • Construct new regional connector road that follows the Lake Powell Pipeline. • Connect SR-59 to 600 North in Hurricane; send trucks to 600 North and modify 600 North to accommodate trucks. • Connect SR-59 to Southern Corridor along Honeymoon Trail. • Improve Smithsonian Butte Scenic Byway; develop as a connector between SR-59 and SR-9.
Recreation	
	• Improve the Three Rivers Trail. • Shuttle service between new airport and Zion National Park with stops in Virgin, Rockville, and Springdale. • Build bike trails from La Verkin to Zion National Park. • Springdale needs a parking structure for the Zion shuttle.
Other	
	• SR-9 between Rockville and Springdale, brush shoulders of debris. • Too much traffic Virgin-Rockville-Springdale. • Provide turnouts for existing and planned historical markers along SR-9. • Floodplain/flooding issues on SR-9 at about MP 19 and MP 30. • Employee shuttles needed from Hurricane to Springdale and Zion. • Improve signage at SR-9/SR-17. Mark highways, directions to park. • Improve 600 North corridor (Hurricane) to relieve pressure on State Street; this would be better for local traffic. • Don't direct trucks to local roads; improve existing intersection of SR-59 and SR-9 instead. • On SR-17, keep trucks with engine brakes away from residential. • At SR-17, MP 0.2, top of hill, need sign to stop semi trucks from jake braking [using engine brakes]. • Rename/reconfigure highway numbers to make SR-9 start at the existing SR-17/SR-9 La Verkin intersection; call existing SR-9 SR-17 instead.

Appendix C. SR-9 Cooperative Corridor Preservation Agreement

Corridor Preservation Agreement on State Route 9
Between I-15 and 860 North in Hurricane City
UTAH DEPARTMENT OF TRANSPORTATION
THE CITY OF HURRICANE

COOPERATIVE
CORRIDOR PRESERVATION AGREEMENT

THIS COOPERATIVE AGREEMENT, made and entered into this _____ day of _____, 20 _____, by and between the **UTAH DEPARTMENT OF TRANSPORTATION,** hereinafter referred to as **"UDOT"** and **THE CITY OF HURRICANE,** a Municipal Corporation in the State of Utah, hereinafter referred to as the **"City",**

WITNESSETH:

WHEREAS, to facilitate traffic flow along the State Route 9 (SR-9) Corridor through Washington County and the City of Hurricane, the parties hereto desire to identify locations for interchanges, intersections and access locations on the state highway; and

WHEREAS, **UDOT** has determined by formal finding that the regulation of intersection and access points for future highway improvements is not a violation of the laws of the State of Utah or any legal contract with the **City**,

THIS COOPERATIVE AGREEMENT is made to set out the terms and conditions whereunder said intersections and access locations shall be preserved.

NOW THEREFORE, it is agreed by and between the parties hereto as follows:

1) The SR-9 Corridor is a vital transportation corridor for the City of Hurricane and is a State Highway facility which provides a major connection from I-15 eastward through the City of Hurricane. The segment between I-15 and the Southern Parkway shall be developed as a grade separated arterial (expressway) facility with interchanges. The segment between the Southern Parkway and the bridge over the Virgin River at approximately 860 North in Hurricane shall be developed as an arterial facility with signalized intersections.

2) To facilitate traffic flow along the SR-9 Corridor between I-15 and the bridge over the Virgin River at approximately 860 North, the locations listed in Table 1 and shown in the attached Figures 1-1 to 1-3 are the only locations at which existing or future grade separated interchanges and signalized intersections will be allowed. All other existing or future accesses will be considered minor accesses and will not be eligible for signalized intersections or grade separated interchanges and may have movement restrictions or other treatments as necessary to make the intersections and the SR-9 Corridor function as safely as possible. Both parties shall develop master plan strategies around this concept and the parties hereto shall work towards the common goal of preserving the mobility and safety of the SR-9 Corridor as identified in this Cooperative Agreement.

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3) The segment of SR-9 between I-15 and the Southern Parkway will be a Principal Arterial (Expressway) and the Access Management Classification will be Category 1 (see UDOT Manual for the Accommodation of Utilities and the Control and Protection of State Highway Rights-of-way) with grade separated interchanges. It is important that the facility be developed to the expressway standards as identified in the "Development Standards for Grade Separated Arterials" developed and approved by UDOT (see attachment) with interchanges spaced at a minimum of 4,500 feet.

4) In order to preserve the integrity of the SR-9 Corridor, any accesses on the major cross streets identified for future interchanges in Table 1 shall be a minimum of 660 feet from the cross street/interchange ramp intersections, with 500 feet being the absolute minimum where topography or other constraints prevent the implementation of the 660 feet recommended spacing.

   Any accesses on the minor cross streets (those not listed in Table 1) shall be a minimum of 200 feet from the SR-9 right-of-way unless a traffic engineering study dictates that a greater separation is needed to maintain the safety and operations of the SR-9 intersection.

5) The locations identified in Table 1 for future grade separated interchanges may be temporarily controlled by the use of stop signs or traffic signals until such time as the locations are warranted for full grade separation. Traffic signals will be installed when traffic signal warrants are met as identified in the Manual on Uniform Traffic Control Devices (MUCTD) or when mutually agreed to by the parties hereto under a systems warrant.

6) The segment of SR-9 between the Southern Parkway and the bridge over the Virgin River at approximately 860 North will be a Principal Arterial and the Access Management Classification will be Category 5 (see UDOT Manual for the Accommodation of Utilities and the Control and Protection of State Highway Rights-of-way) and shall follow the UDOT criteria for such category. Traffic signals may be installed at the locations identified in Table 1 when traffic signal warrants are met as identified in the Manual on Uniform Traffic Control Devices (MUCTD) or when mutually agreed to by the parties hereto under a systems warrant.

7) As the grade separation at the Southern Parkway is installed, a frontage road system on both sides of SR-9 will extend eastward to 2600 West to eliminate all existing access connections to SR-9 between the Southern Parkway interchange and the 2600 West intersection.

8) When development occurs at the locations identified in Table 1 for future interchange locations, both parties will cooperate on any needed analysis and preliminary design activities in order to ensure that proper setbacks have been established and that sufficient rights-of-way have been preserved to accommodate the future interchange layouts and configurations.

9) It is recognized that there are several other accesses, both permitted and non-permitted, that exist along the SR-9 corridor in the area between I-15 and the Southern Parkway. These accesses consist of private driveways, agricultural/farm accesses, minor public streets, subdivision accesses, and the like. These accesses are listed in Table 2 and are based upon the best available knowledge at the time this Cooperative Agreement was prepared. The information in Table 2 may not accurately list every access along the SR-9 Corridor through this segment.

   For these accesses listed in Table 2, both parties will work towards the goal of closing, restricting, rerouting, or modifying them to eliminate all direct accesses to SR-9. The ultimate objective is to close them and provide alternate access routes via adjacent streets or frontage roads to the next adjacent interchanges such that the only accesses to SR-9 between I-15 and the Southern Parkway are at the agreed upon interchange locations shown in Table 1.

10) This Cooperative Agreement may be amended upon mutual consent by both parties.

Table 1: Signalized Intersection and Grade Separated Interchange Locations

Location	Mile Post Reference No.	Existing Access Description	Future Access Description
I-15 Ramp	MP 0.00	Grade Separated Interchange	Grade Separated Interchange
Coral Canyon	MP 0.40	Grade Separated Interchange	Grade Separated Interchange
Telegraph Street (6300 West)	MP 1.11	Signalized Intersection	Grade Separated Interchange
5300 West	MP 2.76	Signalized Intersection	Temporary: Signalized Intersection Permanent: Grade Separated Interchange
4300 West	MP 4.04	Unsignalized Intersection	Temporary: Closed Permanent: Grade Separated Interchange (1)
3700 West	MP 4.95	Unsignalized Intersection	Temporary: Signalized Intersection Permanent: Grade Separated Interchange
3400 West	MP 5.30	Unsignalized Intersection	Temporary: Signalized Intersection Permanent: Grade Separated Interchange

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Location	Mile Post Reference No.	Existing Access Description	Future Access Description
3100 West	MP 5.84	Private Property Driveway (both sides of SR-9)	Temporary: Signalized Intersection[2] Permanent: Closed or Overpass
Southern Parkway (2900 West)	MP 6.52	Does not exist	Temporary: Signalized Intersection Permanent: Grade Separated Interchange [3]
2770 West	MP 6.61	Unsignalized Intersection	Closed
2600 West	MP 7.04	Unsignalized Intersection	Signalized Intersection
2260 West	MP 7.50	Signalized Intersection	Signalized Intersection
1760 West	MP 7.94	Unsignalized Intersection	Signalized Intersection [4]
1550 West/1400 W	MP 8.13/8.33	Does Not Exist	Signalized Intersection [5]
1150 West	MP 8.58	Signalized Intersection	Signalized Intersection
700 West	MP 9.09	Signalized Intersection	Signalized Intersection
300 West	MP 9.46	Signalized Intersection	Signalized Intersection
Main Street	MP 9.78	Signalized Intersection	Signalized Intersection
300 North	MP 10.26	Unsignalized Intersection	Signalized Intersection
500 North	MP 10.49	Unsignalized Intersection	Signalized Intersection
600 North	MP 10.62	Unsignalized Intersection	Closed

[1] The location is proposed with the final location to be determined through a detailed engineering study. Due to the safety concerns at this location, no temporary accesses will be allowed. A grade separated access must be constructed in order for access to be re-established at this location.

[2] A signal will only be allowed if the adjacent land is developed as a hospital or emergency care facility as was currently proposed at the time this agreement was executed. If the adjacent land is developed with any other use, a temporary signal will not be permitted and the permanent configuration is the only one that will be allowed.

[3] The proposed location is approximate and may shift slightly during final design. A minimum distance of 2,600 feet from the Southern Parkway to 2600 West must be maintained.

[4] The City of Hurricane and UDOT reserve the right to investigate other access options at this location that could include some form of grade separation or other access scenario that does not involve a traffic signal.

[5] Either 1550 W or 1400 W would be the signalized intersection, not both. The location for the signal would be determined based on which location satisfied the appropriate MUTCD traffic signal warrants. The other location would be an unsignalized intersection.

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Between I-15 and 860 North in Hurricane City
UTAH DEPARTMENT OF TRANSPORTATION
THE CITY OF HURRICANE

Table 2: Minor Accesses Between I-15 and the Southern Parkway

Location	Mile Post Reference No.	Existing Access Description	Future Access Description
West access location to trailer sales on north side of SR-9	MP 1.48	Gated, paved driveway	Closed and rerouted to future adjacent city streets
Access on south side of SR-9	MP 1.48	Gated, dirt driveway	Closed and rerouted to future adjacent city streets
East access location to trailer sales on north side of SR-9	MP 1.55	Gated, paved driveway	Closed and rerouted to future adjacent city streets
Access to Hurricane City property and power poles on south side of SR-9	MP 1.55	Gated, dirt driveway	Restricted to right-in-right-out only or rerouted to future adjacent city streets
Access to Quail Lake Ranch on north side of SR-9	MP 3.29	Gated, paved driveway	Closed and rerouted to future adjacent city streets
Access to wetland area on south side of SR-9	MP 3.30	Gated, dirt driveway	Restricted to right-in-right-out only
Access to Ash Creek Sewer District pump building on south side of SR-9	MP 3.44	Gated, dirt driveway	Restricted to right-in-right-out only
Access on west side of Ash Creek Sewer District lagoons on south side of SR-9	MP 3.68	Gated, paved driveway	Closed, restricted to right-in-right-out only or rerouted to future adjacent city streets
Road to Quail Lake Estates on north side of SR-9	MP 3.80	Paved, private street	Closed and rerouted to future adjacent city streets
Gated access to Ash Creek Sewer District Lagoons on south side of SR-9	MP 3.80	Gated, dirt driveway	Closed
Road to Quail Lake Estates	MP 3.90	Paved, private street	Closed and rerouted to future adjacent city streets
West access to Chevron gas station on north side of SR-9	MP 3.90	Paved driveway	Closed and rerouted to future adjacent city streets
East access to Chevron gas station on north side of SR-9	MP 3.93	Paved driveway	Closed and rerouted to future adjacent city streets
Proposed future access at east end of jersey barrier on north side of SR-9	MP 4.31	Dirt driveway	Closed and rerouted to future adjacent city streets
Private access to Berry Springs residence on north side of SR-9	MP 4.50	Gated, paved driveway	Closed and rerouted to future adjacent city streets
Agricultural accesses on south side of SR-9	MP 4.56	2 – 16' gated, paved driveways	Closed and rerouted to future adjacent city streets
Access to R.V. parking area west of the sound wall on north side of SR-9	MP 4.57	Gated, paved driveway	Closed and rerouted to future adjacent city streets
3900 West (access to Lava Bluff) on north side of SR-9	MP 4.70	Unsignalized intersection	Closed and rerouted to future adjacent city streets

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Location	Mile Post Reference No.	Existing Access Description	Future Access Description
Access to Anderson property on south side of SR-9	MP 4.80	Gated, paved driveway	Closed and rerouted to future adjacent city streets
Agricultural access on south side of SR-9	MP 5.33	Gated, dirt driveway	Closed and rerouted to future adjacent city streets
Agricultural access on north side of SR-9	MP 6.39	Gated, dirt driveway	Closed and rerouted to future adjacent city streets
Agricultural access on south side of SR-9	MP 6.49	Gated, dirt driveway	Closed and rerouted to future adjacent city streets
Agricultural access on south side of SR-9	MP 6.61	Gated, dirt driveway	Closed and rerouted to future adjacent city streets

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IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their duly authorized officers as of the day and year first above written.

ATTEST:

By _____

Title _____

Date _____

THE CITY OF HURRICANE, a Municipal Corporation in the State of Utah

By _____

Title _____

Date _____

(IMPRESS SEAL)

****

RECOMMENDED FOR APPROVAL:

By _____

Region Four Traffic Engineer

Date _____

UTAH DEPARTMENT OF TRANSPORTATION

By _____

Region Director

Date _____

By _____

UDOT Comptroller Office Contract Administrator

Date _____

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